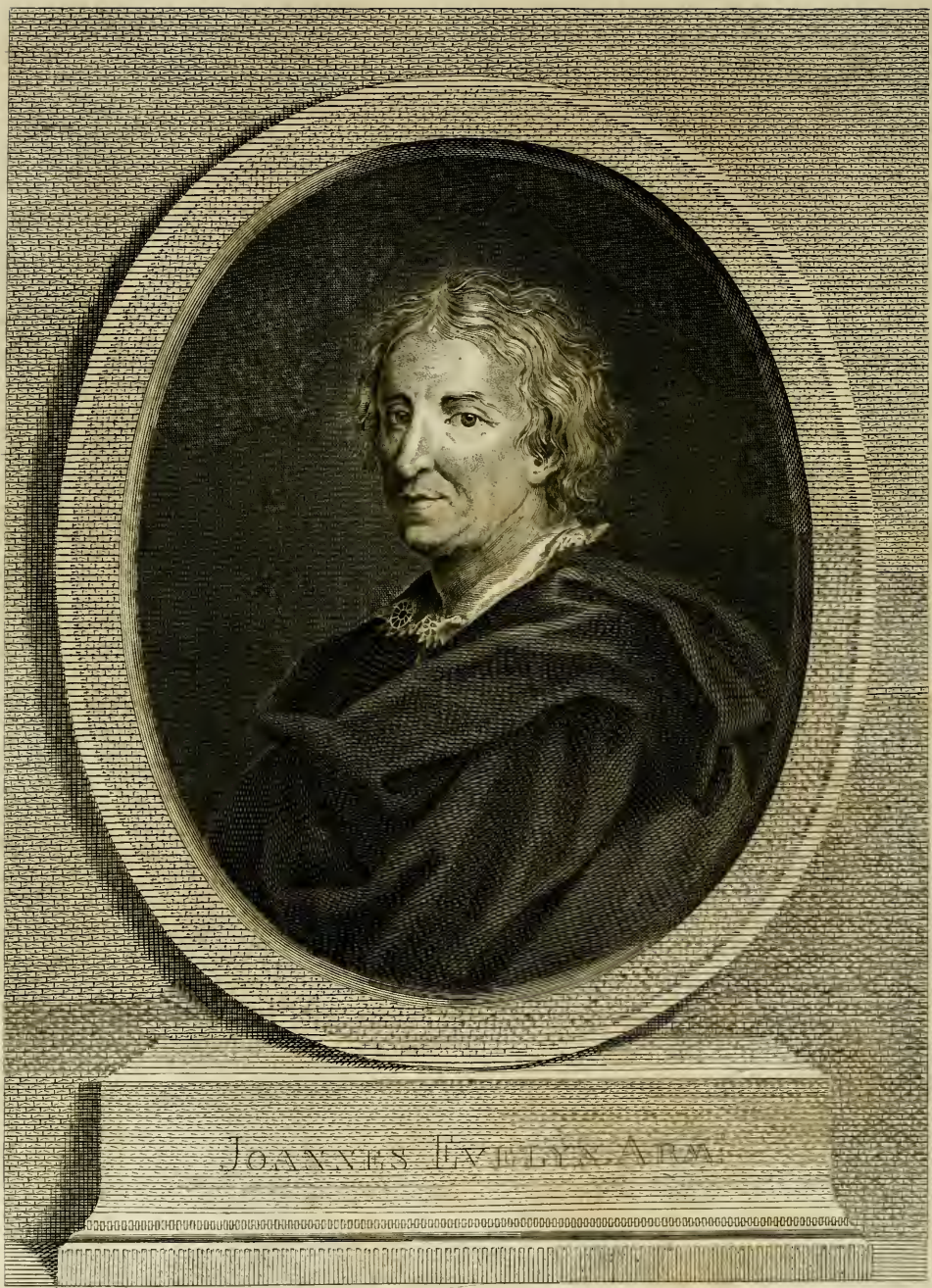

F Bartolozzi del et Sculp. 1775

SILVA:

OR,

A DISCOURSE OF FOREST-TREES,

AND

THE PROPAGATION OF TIMBER

IN HIS MAJESTY'S DOMINIONS;

AS IT WAS DELIVERED IN

The Royal Society, on the 15th of October 1662,

Upon occasion of certain QUERIES propounded to that ILLUSTRIOUS ASSEMBLY, by the Hon. the Principal Officers and Commissioners of the Navy.

TOGETHER WITH

An Historical Account of the Sacredness and Use of

STANDING GROVES.

BY JOHN EVELYN, ESQ. F. R. S.

With NOTES,

BY A. HUNTER, M. D. F. R. S. L. & E.

THE THIRD EDITION,

REVISED, CORRECTED, AND CONSIDERABLY ENLARGED.

TO WHICH IS ADDED

THE TERRA: A PHILOSOPHICAL DISCOURSE OF EARTH.

IN TWO VOLUMES.——VOL. I.

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Anno 1801.

ADVERTISEMENT.

HAVING had the satisfaction to ſee three Editions of this work called for, during a period of twenty-four years, and as this will be the last to which I can expect to put my hand, I have only to expreſs my warmest acknowledgments for the favourable reception that my endeavours have met with.

A. HUNTER.

YORK, JUNE 1, 1800.

TO THE MEMORY

OF

JOHN EVELYN ESQUIRE

A MAN OF GREAT LEARNING SOUND JUDGMENT

AND

MOST EXTENSIVE BENEVOLENCE.

FROM AN EARLY ENTRANCE INTO PUBLIC LIFE

TO AN EXTREME OLD AGE

HE CONSIDERED HIMSELF AS LIVING ONLY FOR

THE BENEFIT OF MANKIND.

READER

DO JUSTICE TO THIS ILLUSTRIOUS

CHARACTER

AND BE CONFIDENT

THAT AS LONG AS THERE REMAINS A PAGE OF

HIS NUMEROUS WRITINGS

AND

AS LONG AS VIRTUE AND SCIENCE HOLD

THEIR ABODE IN THIS ISLAND

HIS MEMORY WILL BE HELD IN THE UTMOST

VENERATION.

THE

EDITOR'S PREFACE

TO THE FIRST EDITION.

IT may appear a matter of singularity that a person of my Profeſsion should engage in a work which, it must be confeſsed, has but a small alliance with Medicine. But I wish to have it known, that, during the whole time this edition was under my hands, I considered it only as affording amusement, and relaxation from studies of a severer kind. To liberal minds this will be a sufficient apology: To persons of a different turn I have nothing to observe. Tacitus says, *Ad utilitatem vitæ omnia facta consiliaque nostra sunt dirigenda:* and I could produce proofs of the highest authority to confirm this excellent sentiment;——but an age eager in pursuit of natural knowledge needs no incitements.

The expense attending this work would have deterred me from the prosecution of it almost as soon as begun, had it not been for a most distinguished Patronage, under whose recommendation the Subscription filled beyond my most sanguine expectations

Since the first edition of the Silva, in 1664, many improvements have been made in planting, and in every branch of natural knowledge. It, therefore, became my indispensable duty to bring down the improvements to the present time. These make the subject of the Notes, which are drawn from the most respectable authorities. I aſsume no merit beyond the arrangement of the materials, having in all places preserved the Author's own words, excepting in cases where the sense was obscured by an impropriety of expreſsion. To join the language of so many different

writers, so as to appear with the uniformity of one author, required at first a considerable degree of attention; but the composition grew easy in proportion as the subject became familiar. To the following Authors I stand particularly indebted: Sir Charles Linnæus, the Rev. Dr. Stephen Hales, the Rev. Mr. Hart, Mr. Bradley, the Rev. Mr. Hanbury, Mr. P. Millar, Mons. Duhamel, Mons. Buffon, the Abbé Shabol, and Profeſsor Kalm; and I make this public acknowledgment to avoid the charge of plagiarism. The Philosophical Transactions of London, have, in many instances, been of singular service to me; and I have had frequent occasion to introduce extracts from my own Georgical Eſsays. I also acknowledge to have received much aſsistance from James Farquharson, Esq. whose excellent Memoir upon the Cultivation of the Scotch Pine is inserted in the twenty-second chapter of the first book.

Mr. Speechly, gardener to his Grace the Duke of Portland, by his Grace's orders, transmitted to me the account published in the first volume, describing the method of planting upon his Grace's estates in Nottinghamshire; and I have great satisfaction in being authorised to say, that this most excellent planter has his Grace's permiſsion to direct gentlemen in the manner of forming plantations——for which he is well qualified in all the varieties of soil and situation. From the same judicious person I am favoured with the Note inserted at the end of the third chapter of the third book, describing a method of raising the PINE APPLE without the use of tanner's bark.

I wish to be known to have received favours from Joseph Banks, Esq. whose desire after natural knowledge is not confined within the limits of the habitable world*.

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* Vide A Voyage towards the North Pole, undertaken by the Hon. Capt. Phipps, in the year 1773. Introduction, p. 12.

His Grace the Duke of Portland lays me under the greatest obligation, by presenting this work with two most elegant views of the GREENDALE OAK. Mr. Grimm's delineation of this venerable Tree deserves the highest encomiums; and I have great satisfaction in acknowledging the merits of Meſsrs. Rooker and Vivares, whose Engravings have done it all imaginable justice. Each View has its Skeleton annexed, that the excellence of the workmanship might not be injured by the Table of Mensuration. Mr. John Miller has shown great elegance and correctneſs in his department as a draughtsman and engraver; and I am singularly obliged to Mr. Bartolozzi for the fine head of Mr. Evelyn, which stands an unrivalled monument of his excellence as an Artist.

I beg leave to present my warmest acknowledgments to Sir John Ruſsel, Bart. and to Thomas Frankland, Esq. for their friendly care in overlooking the artists in their different departments. Without their aſsistance the plates would have been leſs worthy of the public approbation.

I eſteem myself greatly indebted to my most excellent and learned friend the Rev. Mr. Cappe, for his kind aſsistance in the elucidation of several obscure paſsages and corruptions of the Text.

Having explained my motives for undertaking this design, and acknowledged my obligations where due, either for civility or information, I have nothing left but to observe, that the liberties I have taken with the Text, in a variety of places, are warranted from a careful collation of the five editions with some Original Manuscripts, without which I could not poſsibly have proceeded with any degree of satisfaction: for of all the books in the English language, there are, perhaps, none so incorrect as the two last editions of the Silva: The one printed in 1704; the other in 1729.

Soon after the publication of the Silva, which made its appearance in 1664, under the auspices of the Royal Society, the spirit for planting increased to a high degree; and there is reason to believe that many of our ships which, in the last war, gave laws to the whole world, were constructed from Oaks planted at that time. The present age muſt reflect upon this with gratitude; and it is to be hoped that we ſhall be ambitious to receive from Poſterity the ſame acknowledgments that we, at this moment, pay to the memory of our virtuous Ancestors.

A. HUNTER.

York, August 1, 1776.

THE LIFE

OF

MR. JOHN EVELYN.

JOHN EVELYN, the Author of this most excellent and laborious work, was born at Wotton in Surry, the seat of his father Richard Evelyn, Esq. upon the 31st. of October, 1620. He was descended from a very ancient and honourable family, which flourished originally in Shropshire; and was first settled at Wotton, in the reign of Queen Elizabeth. He was instructed in grammar and clafsical learning at the free-school at Lewes in Sufsex, from whence, in the year 1637, he was removed, and entered as a Gentleman-Commoner at Baliol College in Oxford. He remained there about three years, prosecuting his academical studies with great diligence; and then removed to the Middle-Temple in London, in order to add a competent knowledge of the laws of his country to his philological and philosophical acquisitions. Upon the breaking out of the Civil War, he repaired to Oxford; where he obtained leave from King Charles I. under his own hand, to travel into foreign countries for the completion of his education. In the spring of 1644 he left England, in order to make the tour of Europe; which he performed very succefsfully, making it his businefs to inquire carefully into the state of the sciences, and the improvements made in all useful arts, wherever he came. He spent some time at Rome, and happened to be there at the time of Laud's death, which gave him an opportunity of vindicating, in some measure, the memory of that honest, but rash and zealous man. "I was at Rome," says Mr. Evelyn, "in the com-"pany of divers of the English fathers, when the news of the Arch-"bishop's sufferings, and a copy of his sermon made upon the scaffold, "came thither. They read the sermon, and commented upon it, with

" no small satisfaction and contempt; and looked on him as one that " was a great enemy to them, and stood in their way, while one of the " blackest crimes, imputed to him, was his being popishly affected."

Mr. Evelyn visited also other parts of Italy, for the sake of improving himself in architecture, painting, the knowledge of antiquities, medals, &c. His early affection to, and skill in the fine arts, appeared during his travels; for we find, that he delineated on the spot, the prospects of several remarkable places that lie betwixt Rome and Naples: more particularly, " The Three Taverns, or the Forum of Appius," mentioned in the Acts of the Apostles; " the Promontory of Anxur; a Prospect of " Naples from Mount Vesuvius; a Prospect of Vesuvius, as it appears " towards Naples; the Mouth of Mount Vesuvius:" all which were engraved from our Author's sketches by Hoare, an eminent artist at that time. He returned to Paris in the year 1647; where being recommended to Sir Richard Browne, Bart. the King's Minister there, he made his addreſses to his only daughter Mary, whom he soon after married, and by whom he became poſseſsed of Sayes-Court, near Deptford in Kent, where he resided after his return to England, which was about the year 1651. Some time before this he had commenced author; and the following pieces seem to be the first productions of his pen:—1. " Liberty and Servitude." 1649, 12mo. Translated from the French. 2. " A Character of England, as it was lately presented in a letter to a " Nobleman of France, with reflections on Gallus Castratus." 1651, 16mo. The third edition of this book appeared in 1659; at present it is very scarce.—3. " The State of France." 1652, 8vo.—4. " An Eſsay " on the first book of Lucretius, interpreted and made into English " Verse." 1656, 8vo. This translation was decorated with a frontispiece, designed by his ingenious lady; with a panegyrical copy of verses by Mr. Waller, prefixed to it.—5. " The French Gardener; instructing " how to cultivate all sorts of fruit-trees and herbs for the garden." 1658 and several times after. In most of the editions is added, " The English " Gardener vindicated, by John Rose, gardener to King Charles II. with " a tract of the making and ordering of wines in France." The third edition of the " French Gardener," which came out in 1676, was illustrated with copperplates.—6. " The Golden Book of St. Chrysostom, " concerning the education of Children." 1659, 12mo.

The situation of public affairs induced Mr. Evelyn to live very retired at Sayes-Court; and so fond was he of this rural retreat, that he seemed determined to enjoy retirement for life. This studious disposition, together with his disgust of the world, occasioned by the violence and confusion of the times, was so strong, that he actually proposed to Mr. Boyle the raising a kind of college for the reception of persons of the same turn of mind; where they might enjoy the pleasure of society, and at the same time pafs their days without care or interruption. His letter to Mr. Boyle, in which the following plan of a college is contained, is dated the third of September, 1659, and exhibits an agreeable portrait of his philosophic and contemplative mind.

"I propose the purchasing of thirty or forty acres of land, in some "healthy place, not above twenty-five miles from London; of which a "good part should be tall wood, and the rest up-land pastures, or downs "sweetly irrigated. If there were not already a house, which might be "converted, &c. we would erect, upon the most convenient site of this, "near the wood, our building, viz. one handsome pavilion, containing a "refectory, library, withdrawing-room, and a closet; this the first story: "For we suppose the kitchen, larders, cellars, and offices, to be contrived "in the half-story under ground. In the second should be a fair lodging-"chamber, a pallet-room, a gallery, and a closet; all which fhould be "well, and very nobly furnished, for any worthy person that might desire "to stay any time, and for the reputation of the college: The half-story "above for servants, wardrobes, and like conveniences. To the entry "fore-front of this court, and at the other back front, a plot walled in, of "a competent square for the common seraglio, disposed into a garden; "or it might be only carpet, kept curiously, and to serve for bowls, "walking, or other recreations, &c. if the company please. Opposite to "the house, towards the wood, should be erected a pretty chapel; and, "at equal distances, even within the flanking walls of the square, six "apartments or cells for the members of the society, and not contiguous "to the pavilion; each whereof should contain a small bed-chamber, an "outward room, a closet, and a private garden, somewhat after the "manner of the Carthusians. There should likewise be an elaboratory, "with a repository for rarities and things of Nature: an aviary, dove-house, "physic-garden, kitchen-garden, and a plantation of orchard-fruit, &c.

" all uniform buildings, but of single stories, or a little elevated. At " convenient distance, towards the olitory garden, should be a stable for " two or three horses, and a lodging for a servant or two. Lastly, a " garden-house, and conservatory for tender plants. The estimate " amounts thus: the pavilion, four hundred pounds; the chapel, one " hundred and fifty pounds; apartments, walls, and out-housing, six " hundred pounds; the purchaſe of the fee for thirty acres, at fifteen " pounds per acre, eighteen years purchase, four hundred pounds. The " total, fifteen hundred and fifty pounds: sixteen hundred pounds will " be the utmost. Three of the cells or apartments, that is, one moiety, " with the appurtenances, shall be at the disposal of one of the founders, " and the other half at the other's. If I and my wife take up two " apartments, (for we are to be decently asunder however I stipulate, " and her inclination will greatly suit with it) that shall be no impedi- " ment to the society, but a considerable advantage to the œconomic " part: a third shall be for some worthy person. And, to facilitate the " rest, I offer to furnish the whole pavilion completely, to the value of " five hundred pounds, in goods and moveables, if need be, for seven " years, till there shall be a public stock. There shall be maintained " at the public charge, only a chaplain well qualified; an ancient woman " to dreſs the meat, wash, and do all such offices; a man to buy provi- " sions, keep the garden, horses, &c. a boy to aſsist him and serve " within. At one meal a-day, of two dishes only, unleſs some little " extraordinary upon particular days or occasions, (then never exceeding " three) of plain and wholesome meat; a small refection at night; wine, " beer, sugar, spice, bread, fish, fowl, candles, soap, oats, hay, fuel, &c. " at four pounds per week; two hundred pounds per annum: wages " fifteen pounds; keeping the gardens, twenty pounds; the chaplain, " twenty pounds per annum. Laid up in the treasury one hundred and " forty-five pounds, to be employed for books, instruments, drugs, " trials, &c. The total four hundred pounds a-year, comprehending the " keeping of two horses for the chariot or the saddle, and two kine. So " that two hundred pounds per annum will be the utmost that the founders " shall be at to maintain the whole society, consisting of nine persons, " (the servants included) though there should no others join, capable to " alleviate the expense. But if any of those who desire to be of the " society be so well qualified as to support their own particulars, and

" allow for their proportion, it will yet much diminish the charge: and " of such there cannot want some at all times, as the apartments are " empty. If either of the founders think expedient to alter his condition, " or that any thing do HUMANITUS CONTINGERE, he may resign to " another, or sell to his colleague; and dispose of it as he pleases, yet " so as it still continue the institution. ORDERS:—At six in summer, " prayers in the chapel. To study till half an hour after eleven. Din- " ner in the refectory, till one. Retire till four. Then call to conver- " sation (if the weather invite) abroad, else in the refectory. This never " omitted but in case of sickneſs. Prayers at seven. To bed at nine. " In the winter the same, with some abatements for the hours, because " the nights are tedious, and the evenings' conversation more agreeable. " This in the refectory. All play interdicted, *sans* bowls, cheſs, &c. " Every one to cultivate his own garden. One month in spring, a course " in the elaboratory on vegetables, &c. In the winter, a month on other " experiments. Every man to have a key of the elaboratory, pavilion, " library, repository, &c. Weekly fast. Communion once every fort- " night, or month at least. No stranger easily admitted to visit any of " the society but upon certain days weekly, and that only after dinner. " Any of the society may have his commons to his apartment, if he will " not meet in the refectory, so it be not above twice a week. Every " Thursday shall be a music-meeting at conversation hours. Every per- " son of the society shall render some public account of his studies " weekly, if thought fit; and, especially, shall be recommended the " promotion of experimental knowledge, as the principal end of the " institution. There shall be a decent habit and uniform used in the " college. One month in the year may be spent in London or any of " the Universities, or in a perambulation for the public benefit, with what " other orders shall be thought convenient." *Boyle's Works*, vol. II.

The moment that a prospect appeared of the King's restoration, our Author quitted philosophy for politics; and, upon an attempt being made to damp the desires of the people for the King's return, he drew his pen in that critical and important season, in defence of the Royal Person and cause. The title of his piece was: 7. " An Apology for the " Royal Party, written in a letter to a person of the late Council of State;

" with a touch at the pretended plea of the army." 1659, 4to. This pamphlet had a good effect, and was generally so well received, that it ran through three impreſsions that year. Soon after came out a piece, entitled, " News from Bruſsels, in a letter from a near attendant on his " Majesty's Person, to a person of honour here, dated March 10, 1659." The design of this pretended letter was to represent the character of King Charles II. in as bad a light as poſsible; and intended to destroy the impreſsion which had been propagated to his advantage. All the King's friends were extremely alarmed at this attempt, and Mr. Evelyn as much as any of them; who, to furnish an antidote to this poison with all poſsible speed, sent abroad, in a week's time, a complete answer, which bore the following title; 8. " The late News or Meſsage from " Bruſsels unmasked." 1659, 4to.

Immediately after the King's return, Mr. Evelyn was introduced to, and graciously received by him; nor was it long before he received a very singular mark of the King's esteem and confidence; for he was chosen by his Majesty to draw up " A Narrative of a dispute and quarrel " for Precedence, which happened between the Spanish and French Am- " baſsadors," and which would have occasioned a war between those nations, if the King of Spain, though he gained the better in the present scuffle, had not agreed to yield precedence to the French upon all future occasions without any dispute. Mr. Evelyn began now to enter into the active scenes of life, but yet without bidding adieu to his studies; on the contrary, he published, in the space of a few months, no leſs than four pieces: as, 9. " A panegyric at his Majesty King Charles the " Second's Coronation, 1661," folio.—10. " Instructions concerning " the erecting of a Library, translated from the French of Gabriel Naudé, " with some improvements by himself," 1661, 8vo.—11. " Fumifugium; " or the inconveniences of the air and the smoke of London diſsipated, " together with some remedies humbly proposed," 1661, 4to. This was addreſsed to the King and Parliament, and published by his Majesty's expreſs command.—12. " Tyrannus; or the Mode: in a discourse of " sumptuary laws," 1661, 8vo. In the year 1662, when the Royal Society was established, Mr. Evelyn was appointed one of the first Fellows and of the Council. He had given a proof the same year, how well he deserved that distinction, by a small but excellent work, entitled, 13. " Sculptura;

" or the History and Art of Chalcography and Engraving in copper, " with an ample enumeration of the most renowned masters and their " works: to which is annexed a new manner of engraving, or mezzo- " tinto, communicated by his Highneſs Prince Rupert to the Author of " this treatise." 1662, 12mo. A second edition of this work, which was become exceedingly scarce and dear, was printed in 1755, 12mo; " containing some corrections and additions taken from the margin of " the Author's printed copy, an etching of his head, an exact copy of " the mezzotinto done by Prince Rupert, a translation of all the Greek " and Latin paſsages, and memoirs of the Author's life."

Upon the first appearance of the nation's being obliged to engage in a war with the Dutch, the King thought proper to appoint Commiſsioners to take care of the sick and wounded; and Mr. Evelyn was one of the number, having all the ports between Dover and Portsmouth for his district. This was in 1664; within the compaſs of which year his literary labours were not only as great, but even greater, than in any of those preceding. This arose from his earnest desire to support the credit of the Royal Society; and to convince the world, that philosophy was not barely an amusement, fit only to employ the time of melancholy and speculative people, but an high and useful science, worthy the attention of men of the greatest parts, and capable of contributing in a supreme degree to the welfare of the nation. With this view he published, 1. " Silva; or a Discourse of Forest-trees, and the propagation of Timber in " his Majesty's dominions. To which is annexed, Pomona: or, an " Appendix concerning Fruit-trees, in relation to cyder; the making and " several ways of ordering it." 1664 folio. This most valuable work was written at the request of the Royal Society, " upon occasion," as the title tells us, " of certain queries propounded to that illustrious " aſsembly by the Honourable the principal Officers and Commiſsioners " of the Navy;" and published by their order. It has undergone several editions; a second in 1669; a third in 1679, with great additions and improvements; a fourth in 1705, still considerably augmented; and a fifth in 1729, with all the leſser pieces of our Author relating to Agriculture and Gardening annexed, as they were in the fourth. But these two last editions are extremely incorrect.

As a diligent perusal of this last useful treatise may animate our Nobility and Gentry to improve their estates by the never-failing methods there recommended, so an attentive study of our Author's next work may perhaps contribute to improve their taste in building. It is entitled, 15. " A Parallel of the ancient Architecture with the modern, in a col- " lection of ten principal Authors, who have written upon the five " orders, viz. Palladio and Scamozzi, Gerlio and Vignola, D. Barbaro " and Cataneo, L. B. Alberti and Viola, Bullart and De Lorme, com- " pared with one another. The three orders, Doric, Ionic, and Corinthian, " comprise the first part of this treatise; and the two Latin, Tuscan and " Composite, the latter. Written in French by Roland Freart, Sieur de " Cambray; made English for the benefit of Builders. To which is " added, an account of Architects and Architecture, in an historical and " etymological explanation of certain terms, particularly affected by " Architects. With Leo Babtista Alberti's treatise of Statues." 1664, folio. This work, as well as the former, is dedicated to King Charles II. A second edition of it was published in 1669; a third in 1697; and a fourth in 1733, to which is annexed " The Elements of Architecture, " collected by Sir Henry Wotton, and also other large additions."—— 16. Μυςηριον της Ανομιας: " That is, Another part of the Mystery of Jesuitism; " or the new Heresy of the Jesuits, publickly maintained at Paris in the " college of Clermont, the 12th of December, 1661, declared to all the " Bishops of France, according to the copy printed at Paris; together " with the imaginary heresy, in three letters; with divers other parti- " culars relating to this abominable mystery, never before published in " English." 1664, 8vo. This is the only piece of a controversial turn among Mr. Evelyn's works. It has not indeed his name to it: but that it is really his, we learn from a letter written by him to Mr. Boyle.—— 17. " Kalendarium Hortense; or the Gardener's Almanac, directing what " he is to do monthly throughout the year, and what fruits and flowers are " in prime." 1664, 8vo. The second edition of this book was dedicated to Mr. Cowley, with whom our Author maintained a long and inviolable friendship; and it occasioned Mr. Cowley to addreſs to him his mixt eſsay in prose and verse, entitled " The Garden." The Kalendarium Hortense went through a vast number of editions. The Author made additions to it as long as he lived, so that the best is that which was printed by way of appendix to the fourth and last edition of the Silva in his life-time; it is also in the fifth edition of that work printed after his decease.

About this time the University of Oxford received a noble and lasting testimony of Mr. Evelyn's gratitude to the place of his education; for it was he who prevailed with the Lord Henry Howard to bestow the Arundelian marbles, then remaining in the garden of Arundel-house in London, on that University. Lord Howard was also strongly importuned by Mr. Evelyn to send to Oxford an exquisite statue of Minerva; but the sudden death of that Lord prevented its removal from Arundel-house in the Strand. Mr. Evelyn spent his time at this juncture in a manner as pleasing as he could wish: he had great credit at Court, and great reputation in the world; was one of the commiſsioners for rebuilding St. Paul's, attended the meetings of the Royal Society with great regularity, and was punctual in the discharge of his office as a commiſsioner of the sick and wounded. Yet, in the midst of his employments, he found leisure to add fresh labours to those he had already published: As, 18. "The History of the three late famous Imposters, viz. Padre Ottomano, "pretended son and heir to the late Grand Seignior; Mahomet Bei, a "pretended Prince of the Ottoman family, but in truth a Wallachian "counterfeit; and Sabbati Levi, the supposed Meſsiah of the Jews, in "the year 1666; with a brief account of the ground and occasion of the "present war between the Turk and Venetian: together with the cause "and final extirpation, destruction, and exile of the Jews out of the "Empire of Persia." 1668, 8vo. These little histories abound with curious facts; many of which, Mr. Evelyn says, he received from the mouth of a Persian stranger of quality, who had lately resided in London. This work was highly commended in the Acta Eruditorum Lipsiensium for the year 1690, with this remarkable circumstance, that the pretended Mahomet Bei was, at that very time, in the city of Leipsic. Sir George Mackenzie, an admired eſsay-writer of that age, having written "A "Panegyric on Solitude," our Author, by way of antidote, published a piece, entitled: 19. "Public Employment and an active Life, with all "its Appenages, preferred to Solitude." 1667, 12mo.—20. "An idea "of the Perfection of Painting, demonstrated from the principles of art, "and by examples conformable to the observations which Pliny and "Quintilian have made upon the most celebrated pieces of the ancient "painters, paralleled with some works of the most famous modern "painters, Leonardo de Vinci, Raphael, Julio Romano, and N. "Pouſsin: written in French by Roland Freart, and now translated." 1668, 12mo.

In the year 1669, Mr. Evelyn made a journey to Oxford, where he was honoured with a Doctor of Law's degree, as a mark of gratitude for the credit and services he had done them. To say the truth, he obtained all his honours without any solicitations of his own. Thus, when King Charles II. in order to promote trade, thought proper to erect a board for that purpose, and named several persons of great rank to be members of that council, he appointed Mr. Evelyn to be amongst them; who, to expreſs his gratitude for the favour, digested in a short and plain dis course, the chief heads of the history of trade and navigation, and dedicated it to the King. The title of it runs thus: 21. "Navigation and "Commerce; their original and progreſs: containing a succinct account "of traffic in general; its benefits and improvements; of discoveries, "wars, and conflicts at sea, from the original of navigation to this day; "with special regard to the English nation; their several voyages and "expeditions, to the beginning of our late differences with Holland: in "which his Majesty's title to the dominion of the sea, is aſserted against "the novel and later Pretenders." 1674, 12mo. The Royal Society having ordered that every member of the council should in his turn pronounce, at their several meetings, a discourse on some subject of experimental philosophy, Mr. Evelyn presented them with a treatise, entitled: 22. "TERRA: A Philosophical Discourse of Earth, relating to the culture "and improvement of it for vegetation, and the propagation of plants."— This celebrated work was first printed in 1675, since which time it has undergone several impreſsions. The last edition was published in 1778, in 8vo, with notes by Dr. Hunter of York. The winter of 1683 being memorably severe, the fine plantations of our Author at Sayes-Court suffered irreparable damage; of which he gave a philosophical and pathetical account to the Royal Society the succeeding spring. But the Czar of Muscovy, who afterwards resided in this house of Mr. Evelyn, for the sake of being near Deptford-yard, is said to have committed almost as great devastations on his delicious garden as this lamentable frost.

After the acceſsion of King James II. we find Mr. Evelyn, in December 1685, appointed, with Lord Viscount Tiviot and Colonel Robert Philips, one of the Commiſsioners for executing the office of Lord Privy-seal, in the absence of Henry Earl of Clarendon, Lord Lieutenant of Ireland; which place he held till the 11th of March, 1686, when the

King was pleased to make Henry Baron Arundel, of Wardour, Lord Privy-seal. He wrote nothing during this reign. After the revolution, he was made Treasurer of Greenwich Hospital, and, though he was then much in years, yet he continued to publish treatises upon several subjects: As, 23. "Mundus Muliebris; or, the Lady's Dressing-Room "unlocked, and her Toilet spread. In burlesque. Together with the "Fop-Dictionary, compiled for the use of the fair sex." 1690, 4to.—24. "Monsieur de la Quintinye's Treatise of Orange-Trees, with the "raising of Melons, omitted in the French editions, translated into "English." 1693.—25. "Numismata: a discourse of Medals, ancient "and modern, together with some account of heads and effigies of "illustrious and famous persons, in sculps and taille-douce, of whom we "have no medals extant, and of the uses to be derived from them. To "which is added, a digression concerning Phisiognomy." 1697, folio. The Connoisseurs look on this treatise as one of the perfectest on the subject in any language; and it is said to be greatly admired by foreigners of taste. We are now arrived at the last publication with which our Author enriched the republic of letters; it is entitled:—26. "Acetaria; or a discourse of Sallets." 1699, 12mo. It was dedicated to the Lord Chancellor Somers, at that time President of the Royal Society: and, though Mr. Evelyn was then in his eightieth year, it bears no marks of extreme age or impaired abilities.

Nor had Mr. Evelyn been less generous in imparting his knowledge to others out of his own private collections, than by what he had published for the use of all. He communicated to Mr. Boyle a curious and exact account of the method by which the magazines of snow are preserved in Italy for the use of the tables of the great. The late learned Bishop of London, Dr. Gibson, was furnished by him with those additional remarks on the county of Surrey, which are published in his English edition of Camden's Britannia. He contributed largely to Mr. Houghton's "Husbandry and Trade improved;" and Mr. Aubrey has testified how often he was indebted to him for his friendly assistance in many of his undertakings. In regard to the Royal Society, he was very assiduous in transmitting to them whatever fell within the compass of his inquiries, and used to style himself, humbly, "A pioneer in the service "of the Royal Society." He certainly removed many obstructions, and

smoothed the roads that led directly to the temple of Wisdom and Truth. When we consider the number of books he published, and the variety of the subjects on which he employed his time, it is impoſsible to forbear wondering at his industry and application; and our wonder must be greatly heightened, when we reflect how careful he was in reviewing correcting, and augmenting all his original works. But this is not all; for he left behind him unfinished, or at least unpublished, works of a more extensive nature than those that are printed, which had cost him incredible pains, and for which he had made prodigious collections.— His great work of all was intended to be called "A general History of "all Trades;" of which we have an account in one of his own letters to Mr. Boyle, where he aſsigns the reasons for laying it aside. But though he desisted from the original plan, yet it was not till he had finished several parts of it; particularly his chalcography, which Mr. Boyle prevailed on him to publish, and the following pieces which he never published: "Five Treatises, containing a full view of the several arts of "painting in oil, painting in miniature, annealing in glaſs, enamelling, "and making marble paper;" and "The plan of a Royal Garden, "describing and showing the amplitude of that part of Georgics which "belongs to Horticulture." To these his unpublished works we must add another, mentioned only by Mr. Wood, who gives us nothing concerning it but the following title: "A Treatise of the dignity of man."

Full of age and honours, this amiable Author died upon the 27th of February, 1705-6, in the 86th year of his age; and was interred at Wotton, under a tomb of about three feet high of free-stone, shaped like a coffin, with an inscription upon the marble with which it is covered, expreſsing, according to his own intention, that, "Living in an age of "extraordinary events and revolutions, he had learned from thence this "truth, which he desired might be thus communicated to posterity: THAT "ALL IS VANITY WHICH IS NOT HONEST; AND THAT THERE IS "NO SOLID WISDOM BUT IN REAL PIETY." As to the elogiums which ingenious and learned men have bestowed upon Mr. Evelyn, they are as numerous as they are great. Mr. Cowley, as we have already observed, inscribed his Poem, called "The Garden," to him; and hath said the highest things of him in the preface to it. Mr. Glanville has

given a great character of our Author: "Mr. John Evelyn," says he, "hath very considerably advanced the history of fruit and forest-trees, "by his Silva and Pomona; and greater things are expected from his "preparations for the Elysium Britannicum; a noble design now under "his hands. And certainly the inquisitive world is much indebted to "this generous gentleman for his very ingenious performances in this "kind; as also for those others of sculpture, picture, architecture, and "the like useful things, with which he hath enriched it." The learned and judicious Mr. Wotton, in his "Reflections on ancient and modern "learning," speaks of Mr. Evelyn in still higher terms; and says, that "it may be esteemed a small character of Mr. Evelyn's Silva, or dis-"course of Forest-trees, to say that it outdoes all that Theophrastus and "Pliny have left us on that subject; for it not only does that and a great "deal more, but contains more useful precepts, hints, and discoveries "upon that now so necessary a part of our *res rustica*, than the world "had till then known from all the observations of former ages." Bishop Burnet, acknowledging some communications from him, styles him, "a "most ingenious and virtuous gentleman, who is not satisfied to have "advanced the knowledge of this age by his own most useful and suc-"cessful labours about Planting, and divers other ways, but is ready to "contribute every thing in his power to perfect other men's endeavours." Another eminent Author, speaking of his Numismata, gives the following character of that book and its Author: "We might justly have expected, "whatever could have been desired on this subject, from the excellently "learned pen of Mr. Evelyn, had he bent his thoughts, as was believed "towards the consideration of our British coins as well as medals. It "now appears that his Numismata carried him no farther than those "larger and more choice pieces that are usually called by this latter "name, whereon he has indeed treated with that accuracy and fineness "which became a gentleman and scholar."

By his excellent wife, who survived him about three years, he had five sons and three daughters. Of the latter, one only survived him, Susannah, married to William Draper, Esq. of Adscomb, in Surrey. Of the former, all died young except Mr. John Evelyn, the Author of many Translations both in prose and verse, and of some original compositions in

Dryden's Miscellanies. He was the father of Sir John Evelyn, created a Baronet by letters patent, bearing date July 30, 1713, and great grandfather to the present Sir Frederick Evelyn, now residing upon the family Estate at Wotton in Surrey.

AUGUST 1, 1776.

TO

THE KING'S MOST SACRED MAJESTY,

CHARLES THE SECOND.

FOR to whom, Sir, with so just and equal right should I present the fruits of my labours, as to the Patron of that Society, under whose Influence it was produced, so to whose Auspices alone it owes the favourable acceptance which it has received in the world? To you then, Royal Sir, does this Third Edition continue its humble addreſses, *tanquam Nemorum Vindici*, as of old, they paid their devotions *Herculi et Silvano*; since you are our Θεὸς ὑλικὸς, our *Nemorensis Rex*; as having once had your Temple, and Court too, under

that sacred Oak which you consecrated with your Presence, and we celebrate, with just acknowledgment to God, for your Preservation.

I need not acquaint your Majesty how many millions of timber-trees, besides infinite others, have been propagated and planted throughout your vast dominions, at the instigation, and by the sole direction of this work; because your gracious Majesty has been pleased to own it publickly for my encouragement, who, in all that I here pretend to say, deliver only those precepts which your Majesty has put into practice; as having, like another Cyrus, by your own royal example, exceeded all your predeceſsors in the plantations you have made, beyond, I dare aſsert it, all the monarchs of this nation, since the conquest of it. And, indeed, what more august, what more worthy your Majesty, or more becoming our imitation, than, whilst you are thus solicitous for the public good, we pursue your Majesty's great example, and, by cultivating our decaying woods, contribute to your power, as to our greatest wealth and safety; since whilst your Majesty is furnished to send

forth those Argos and Trojan horses, about this happy island, we are to fear nothing from without it; and whilst we remain obedient to your just commands, nothing from within it.

It is now some years past, that your Majesty was pleased to declare your favourable acceptance of a Treatise of Architecture, which I then presented to you, with many gracious expreſsions, and that it was a most useful piece. Sir, that encouragement (together with the succeſs of the book itself, and of the former editions of this) has animated me still to continue my oblation to your Majesty of these improvements: nor was it certainly without some provident conduct, that we have been thus solicitous to begin, as it were, with materials for building, and Directions to Builders, if due reflection be made on that deplorable calamity, the conflagration of your imperial city; which, nevertheleſs by the bleſsing of God, and your Majesty's gracious influence, we have seen rise again a new and much more glorious Phœnix.

This tribute I now once more lay at the feet of our Royal Founder.

May your Majesty be pleased to be invoked by that no inglorious title, in the profoundest submiſsion of,

Gracious Sir,

Your Majesty's

Ever loyal, most obedient,

And faithful Subject and Servant,

SAYES-COURT, DEC. 5, 1678. J. EVELYN.

TO THE READER.

AFTER what the frontispiece and porch of this wooden edifice presents you, I shall need no farther to repeat the occasion of this following discourse: I am only to acquaint you, that as it was delivered to the Royal Society, by an unworthy member thereof, in obedience to their commands; by the same it is now re-published without any farther prospect: And the reader is to know, that if these dry sticks afford him any sap, it is one of the least and meanest of those pieces which are every day produced by that illustrious assembly, and which enrich their collections, as so many monuments of their accurate experiments, and public endeavours, in order to the production of real and useful theories, the propagation and improvement of natural science, and the honour of their institution. If to this there be any thing subjoined here, which may a while bespeak the patience of the reader, it is only for the encouragement of an industry, and worthy labour, much in our days neglected, as haply reputed a consideration of too sordid and vulgar a nature for noble persons and gentlemen to busy themselves withal, and who oftener find out occasions to fell down and destroy their woods and plantations, than either to repair or improve them.

But we are not without hopes of taking off these prejudices, and of reconciling them to a subject and an industry which has been consecrated, as I may say, by as good and as great 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; Licinius, surnamed Stolo, Cato, and Cincinnatus; the Pisos, Fabii, Cicero, the Plinys, and thousands more whom I might enumerate, that disdained not to cultivate these rusticities even with their own hands, and to esteem it no small accession to dignify their titles, and adorn their purple with these rural characters of their affections to planting, and love of this part of Agriculture, which has transmitted to us their venerable names through so many ages and vicissitudes of the world.

That famous answer alone which the Persian Monarch gave to Lysander, will sufficiently justify that which I have said, besides what we might add out of our writings and examples of the rest: but since these may suffice, after due reproofs of the late impolitic waste and universal sloth amongst us, we should now turn our indignation into prayers, and address ourselves to our better-natured countrymen, that such woods, as do yet remain entire, might be carefully preserved, and such as are destroyed, sedulously repaired: It is what all persons who are owners of land may contribute to, and with infinite delight, as well as profit, who are touched with that laudable ambition of imitating their illustrious ancestors, and of worthily serving their generation. To these my earneſt and humble advice should be; that at their first coming to their estates, and as soon as they get children, they would seriously think of this work of propagation also: for I observe there is no part of husbandry which men commonly more fail in, neglect, and have cause to repent of, than that they did not begin planting betimes, without which they can expect neither fruit, ornament, or delight from their labours. Men seldom plant trees till they begin to be wise, that is, till they grow old, and find, by experience, the prudence and neceſsity of it. When Ulyſses, after a ten years absence, was returned from Troy, and coming home, found his aged father in the field planting of trees, he asked him, " Why, being now so " far advanced in years, he would put himself to the fatigue and labour " of planting that, of which he was never likely to enjoy the fruits?" The good old man, taking him for a stranger, gently replied: " I plant against " my son Ulyſses comes home." The application is obvious, and instructive for both old and young; and we have a more modern instance almost like that of the good old Laertes.—Upon the complaint of learned persons and great travellers deploring the loſs of many rare and precious things, trees and plants, especially instancing the Balsam-tree of Gilead, (now almoſt, if not altogether, failing, and no more to be found where it grew in great plenty,) application is made to young men, to consider it seriously, and to fall a planting while time is before them, with this encouraging exclamation, " Agite, ô Adolescentes, et antequam " canities vobis obrepat, stirpes jam alueritis, quæ vobis, cum insigni " utilitate, delectationem etiam adferent: Nam quemadmodum canities " temporis succeſsu, vobis insciis, sensim obrepit: Sic natura vobis " inserviens educabit quod telluri vestræ concredetis, modò prima initia

See Petrarch de Remed. utriusque fortunæ, Lib. i. Dial. 57.

" illi dederitis."——PET. BELONIUS* *De neglecta stirpium Cultura. Problema ix.*

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. " Male agitur cum Domino quem " Villicus docet," was an observation of old Cato's; and it was Ischomachus who told Socrates, discoursing one day upon a like subject, " That " it was far easier to make than to find a good husbandman:" I have often proved it so in gardeners, and I believe it will hold in most of our country employments. Country people universally know, that all trees consist of roots, stems, boughs, leaves, &c. but can give no account of the species, virtues, or farther culture, besides the making of a pit or hole, casting and treading in the earth, &c. which require a deeper search than they are capable of; we are then to exact labour, not conduct and reason, from the greatest part of them: and the business of planting is an art or science, (for so Varro has solemnly defined it,) and very different from what many in his time accounted of it; " Facillimam esse nec " ullius acuminis Rusticationem," namely, That it was an easy and insipid study. It was the simple culture only, with so much difficulty retrieved from the late confusion of an intestine and bloody war, like that of ours, and now put in reputation again, which made the noble poet write: De R. R.

——————" Verbis ea vincere magnum
" Quam fit, et augustis hunc addere rebus honorem!" GEORG. iii.

——————" How hard it was
" Low subjects with illustrious words to grace!"

Seeing, as the Orator does himself expresse it, " Nihil est homine libero " dignius," there is nothing more becoming and worthy of a gentleman, no, not the majesty of a Consul†. In ancient and best times, men were not honoured and esteemed for the only learned who were great linguists, profound critics, readers and devourers of books, but such whose studies consisted of the discourses, documents, and observations of their forefathers, ancient and venerable persons, who (as the excellent author of

In agris erant tunc Senatores. Cic. de Senect.

† Silvæ sint Consule dignæ See this of the Poet interpreted by Scaliger. Lib. i. c. i. Poet.

* P. Beloni wrote in French, and his work here quoted, was turned into Latin by Car. Clusius, in 1589. *Ed.*

the rites of the Israelites, chap. xv. &c. acquaints us) were not only obliged to instruct and inform their children of the wonderful things God had done for their ancestors, together with the precepts of the moral law, feasts, and religious ceremonies, but taught them likewise all that concerned Agriculture, joined with leſsons of perpetual practice, in which they were, doubtleſs, exceedingly knowing, whilst, during so many ages, they employed themselves almost continually in it: And though now-a-days this noble art be for the most part left to be exercised amongst us by people of groſser and unthinking souls, yet there is no science whatever which 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 eruditi and learned men. An Israelite, who, from tradition of his forefathers, his own experience, and some modern reading, had informed himself of the religion and laws which were to regulate his life, and knew how to procure things necessary; who perfectly understood the several qualities of the earth, plants, and places agreeable to each sort, and to cultivate, propagate, defend them from accidents, and bring them to maturity; that also was skilled in the nature of cattle, their food, diseases, remedies, &c. (which those who amongst us paſs for the most learned and accomplished gentlemen and scholars, are, for the most part, groſsly ignorant of, and look upon as base, rustic, and things below them,) is, in this learned author's opinion, infinitely more to be valued than a man brought up either in wrangling at the bar, or the noisy and ridiculous disputes of our schools, &c. To this sense the learned Modena. And it is remarkable, that after all that wise Solomon had said, "that ALL was vanity and vexation of spirit," among so many particulars he reckons up, he should be altogether silent, and say nothing concerning husbandry; as, doubtleſs, considering it the most useful, innocent, and laudable employment of our life, requiring those, who cultivate the ground, to live in the country, remote from city-luxury, and the temptation to the vices he condemns. It was indeed a plain man, a potter by trade; but let no body despise him because a potter, (Agathocles, a king, was of that craft) who, in my opinion, has given us the true reason why husbandry, and particularly planting, is no more improved in this age of ours, especially where persons are lords and owners of much land: "The truth is," says he, "when men have acquired any "considerable fortune by their good husbandry and experience, (forgetting

Paliſsy, le Moyen de devenir Riche.

" that the greatest Partriarchs, Princes, their sons and daughters, belonged " to the plough and the flock,) they account it a shame to breed up their " children in the same calling which they themselves were educated in, " but presently design them gentlemen. They must, forsooth, have a coat " of arms, and live upon their estates; so as by the time the son's beard is " grown, he begins to be ashamed of his father, and would be ready to " defy him that should, upon any occasion, mind him of his honest " extraction: And if it chance that the good man have other children " to provide for, *This* must be the darling, be bred at school and the " university, whilst the rest must to cart and plough with the father." " This is the cause," says my author, " that our lands are so ill cultivated " and neglected: Every body will subsist upon their own revenue, and " take their pleasure, whilst they resign their estates to be managed by " the most ignorant, the children whom they leave at home, or the " hinds to whom they commit them; when, as in truth and reason, the " more learning, the better philosophers, and the greater abilities they " poſsefs, the more and better they are qualified to cultivate and improve " their estates." Methinks this is well and rationally argued.

And now you have in part what I had to produce in extenuation of this adventure: that, animated with a command, and aſsisted by divers worthy persons, (whose names I am prone to celebrate with all just respects,) I have presumed to cast in my symbol; which, with the rest that are to follow, may, I hope, be in some degree serviceable to him (whoever the happy person may be) that shall oblige the world with that complete system of Agriculture, which as yet seems a desideratum, and wanting to its full perfection. This, I aſsure you, is one of the principal designs of the Royal Society, not in this particular only, but through all the liberal and more useful arts; for which, in the estimation of all equal judges, it will merit the greatest of encouragements; that so at last, what the learned Columella has wittily reproached, and complained of, as a defect in that age of his, concerning Agriculture in general, and is applicable here, may attain its desired remedy and consummation in this of ours.

" Sola Res Rustica, quæ sine dubitatione proxima, et quasi consan- " guinea Sapientiæ est, tam discentibus egeat, quam magistris: Adhuc " enim Scholas Rhetorum, et Geometrarum, Musicorumque, vel quod " magis mirandum est, contemptiſsimorum vitiorum officinas, gulosius

Præfat. ad P. Silvinum; which I earnestly recommend to the ſerious perusal of our gentry.

Voluptates agricolarum mihi ad sapientis vitam proximè videntur accedere. Cic. de Senectute.

" condiendi cibos, et luxuriosius fercula struendi, capitumque et capillorum concinnatores, non solum esse audivi, sed et ipse vidi; Agricolationis neque Doctores, qui se profiterentur, neque Discipulos cognovi " But this I leave for our peruked gallants to interpret, and should now apply myself to the directive part, which I am all this while bespeaking, if, after what I have said in the several paragraphs of the ensuing discourse upon the argument of wood, (and which in this edition, coming abroad with innumerable improvements and advantages, so furnished as I hope shall neither reproach the author or repent the reader,) it might not seem superfluous to have premised any thing here for the encouragement of so becoming an industry. There are divers learned and judicious men who have preceded me in this argument; as many, at least, as have undertaken to write and compile vast herbals and theatres of plants; of which we may have some of our own countrymen, (especially the most industrious and learned Mr. Ray,) who have boldly, I dare affirm it, surpafsed any, if not all the foreigners that are extant. In those it is you meet with the discription of the several plants, by discourses, figures, names, places of growth, time of flourishing, and their medicinal virtues, which may supply any deficiency of mine as to those particulars; if, forbearing the repetition, it should by any be imputed for a defect, though it were indeed none of my design. I say these things are long since performed to our hands; but there is none of these (that I at least know of, and are come to my perusal) who have taken any considerable pains how to direct and encourage us in the culture of Forest-trees, the grand defect of this nation, besides some small sprinklings to be met with in Gervas Markham, Old Tufser; and, of foreigners, the Country-farm, long since translated out of French, and by no means suitable to our clime and country. Neither have any of these proceeded after my method, and so particularly in raising, planting, dreſsing, governing, &c. or so sedulously made it their businefs to specify the mechanical uses of the several kinds, as I have done, which was hitherto a great desideratum, and in which the reader will likewife find some things altogether new and instructive; together with directions and encouragements for the propagation of some foreign curiosities of ornament and use, which were hitherto neglected. If I have upon occasion presumed to say any thing concerning their medicinal properties, it has been modestly and frugally, and with chief, if not only, respect to the poor woodman, whom none, I presume, will

envy, that, living far from the physician, he should, in case of neceſsity, consult the Reverend Druid, his Oaks*, and his Elm, Birch, or Elder, for a short breath, a green wound, or a sore leg, casualties incident to his hard labour. These are the chief particulars of this ensuing work, and what it pretends hitherto of singular, in which, let me be permitted to say, there is sufficient for instruction, and more than is extant in any collection whatsoever (absit verbo invidia) in this way, and upon this subject, abstracting things practicable, of solid use, and material, from the ostentation and impertinences of divers writers, who, receiving all that came to hand on trust, with a view to swell their monstrous volumes, have hitherto imposed upon the credulous world, without conscience or honesty. I will not exasperate the adorers of our ancient and late naturalists, by repeating what our Verulam has justly pronounced concerning their rhapsodies, because I likewise honour their painful endeavours, and am obliged to them for much of that I know; nor will I, with some, reproach Pliny, Porta, Cardan, Mizaldus, Cursius, and many others of great name, whose writings I have diligently consulted, because of the knowledge they have imparted to me on this occasion; but I must deplore the time which is, for the most part, so miserably lost in pursuit of their speculations, where they treat upon this argument. The world is now advised, and, bleſsed be God, infinitely redeemed from that base and servile submiſsion of our noblest faculties to their blind traditions. This, you will be apt to say, is a haughty period; but whilst I affirm it of the past, it justifies and does honour to the present industry of our age; and of which there cannot be a greater and more emulous instance than the paſsion of his Majesty to encourage his subjects, and of the Royal Society, (his Majesty's Foundation) who receive and promote his dictates, in all that is laudable and truly emolumental of this nature.

It is not therefore that I here presume to instruct him in the management of that great and august enterprize of resolving to plant and repair his ample forests, and other magazines of timber, for the benefit of his Royal Navy, and the glory of his kingdoms; but to present to his Sacred Majesty, and to the world, what advices I have received from others, observed myself, and most industriously collected from a studious propensity to serve as one of the least intelligences in the ampler orb of our illustrious Society, and in a work so neceſsary and important.

* Ne Silvæ quidem, horridiorque naturæ facies, medicinis carent, ſacra illa parente rerum omnium, nuſquam non remedia diſponente homini, ut medicina fieret etiam solitudo ipsa. Hinc nata Medicina. Hæc sola naturæ placuerat eſse remedia parata vulgo, inventu facilia, ac sine impendio, & quibus, vivimus. Plin. lib. xxvi. cap. i.

And now, since I have mentioned the Society, give me leave, worthy reader, as a member of that body which has been the chief promoter of this ensuing work, to vindicate (as I stand obliged) that assembly, and consequently the honour of his Majesty and the nation, in a particular which concerns it, though in appearance, a little foreign to the present subject.

I will not say that all which I have written in the several paragraphs of this treatise is new; but that there are very many new and useful things and observations, (without insisting on the method only,) not hitherto delivered by any author, and so freely communicated, I hope will sufficiently appear. It is not therefore in behalf of any particular which concerns myself that I have been induced to enlarge this preface; but, by taking this occasion, to encounter the unsufferable boldness or ambition of some persons, as well strangers as others, arrogating to themselves the being inventors of divers new and useful experiments, justly attributable to several members of the Royal Society *.

So far has that Assembly been from affecting glory, that they seem rather to have declined their due; not as ashamed of so numerous and fair an offspring; but as abundantly satisfied that, after all the hard measure and virulent reproaches they had sustained for endeavouring, by united attempts, and at their own charges, to improve real philosophy, they had, from time to time cultivated that province, in so many useful

* Consult the History of the Royal Society and their registers.——The laws of motion, and the geometrical streightening of curve-lines, were first found out by Sir Christopher Wren and Mr. Thomas Neile.——The equated isocrone motion of the weight of a circular pendulum in a paraboloeid, for the regulating of clocks, and the improving pocket-watches by springs applied to the balance, were first invented and demonstrated to this Society by Dr. Hooke; together with all those new and useful instruments, contrivances, and experiments, mathematical and physical, published in his posthumous works by the most accomplished Mr. Waller, Secretary to the Royal Society; and since, those of the incomparable learned Sir Isaac Newton, now President of the Royal Society; Mr. Halley, the worthy Professor of Geometry in the University of Oxford; Dr. Grew, and several more, whose works and useful inventions sufficiently celebrate their merits. I do not mention the Barometer, to which might be added the prodigious effects of the Speculum Ustorium, surpassing what the French confidently, or rather audaciously, pretend to; nor the other admirable inventions, injuriously arrogated by strangers, though due of right to Englishmen, and members of this Society; for it is not the business of this preface to enumerate all, though it was necessary to touch on some instances.

and profitable instances as are already published to the world, and will be easily aſserted to their authors before all equitable judges.

This being the sole inducement of publishing this apology, it may not perhaps seem unseasonable to disabuse some, otherwise, well-meaning people, who, led away and perverted by the noise of a few ignorant and comical buffoons, (whose malevolence or impertinences entitle them to nothing that is truly great and venerable,) are, with an insolence suitable to their understanding, still crying out, and asking, What have the Society done?

Now, as nothing leſs than miracles (nor those, unleſs God should every day repeat them at the call of these extravagants) will convince some persons of the most rational and divine truths, already so often and extraordinarily established, so neither will any thing satisfy these unreasonable men, but the production of the Philosopher's Stone and Great Elixir; which yet were they poſseſsors of, they would consume upon their luxury and vanity.

It is not, therefore to gratify these magnificent fops, whose talents reach but to the adjusting of their peruques, courting a miſs, or at the farthest, writing a smutty or scurrilous libel, which they would have to paſs for genuine wit, that I concern myself in these papers; but, as well in honour of our Royal Founder, as the nation, to aſsert what by other countries has been ſurreptitiously arrogated, and by which they not only value themselves abroad, but, prevailing on the modesty of that industrious aſsembly, seek the deference of thoſe who, whilst it remains still silent, do not so clearly discern this glorious plumage to be purely ascititious, and not a feather of their own.——But still, what have they done?

Those who perfectly comprehend the scope and end of that noble Institution, which is to improve natural knowledge, and enlarge the empire of operative philosophy, not by an abolition of the old, but by the real effects of the experimental, collecting, examining, and improving their scattered phænomena, with a view to establish even the received methods and principles of the schools, as far as were consistent with truth and matter of fact, thought it long enough that the world had been imposed upon by that notional and formal way of delivering divers systems and bodies of philosophy, falsely so called, beyond which there was no more country to discover; which being brought to the test and trial, vapours all away in fume and empty sound.

This structure then being thus ruinous and crazy, it is obvious what they were to do; even the same which skilful architects do every day before us; by pulling down the decayed and sinking wall, to erect a better and more substantial in its place. They not only take down the old, reject the uselefs and decayed, but sever such materials as are solid, and will serve again; bring new ones in, prepare and frame a model suitable to so magnificent a design: This Solomon did in order to the building of the material temple; and this is here to be pursued in the intellectual: Nay, here was abundance of rubbish to be cleared, that the area might be free; and then was the foundation to be deeply searched, the materials accurately examined, squared, and adjusted before it could be laid: Nor was this the labour of a few; lefs than a much longer time, more cost and encouragement than any which the Society has yet met withal, could not in reason be sufficient effectually to go through so chargeable a work, and highly neceſsary.

A long time it was they had been surveying the decays of what was ready now to drop in pieces. Whatever show the outside made with a noise of elements and qualities, occult and evident, abhorrence of vacuum, sympathies, antipathies, substantial forms, and prime matter courting form; epicycles, Ptolemean hypotheſis, magisterial definitions, peremptory maxims, speculative and positive doctrines, and alti-sonant phrases, with a thousand other precarious and unintelligible notions, (all which they have been turning over to see if they could find any thing sincere and useful among this pedantic rubbish, but in vain,) here was nothing material, nothing of moment, mathematical or mechanical, and which had not been miserably sophisticated, on which to lay the streſs; nothing in a manner whereby any farther progreſs could be made, for the raising and ennobling the dignity of mankind in the sublimest operations of the rational faculty, by clearing the obſcurities, and healing the defects of most of the physiological hypotheses, repugnant, as they hitherto seemed to be, to the principles of real knowledge and experience.

Now, although it was neither in their hopes or in their prospect to consummate a design requiring ſo mighty aids, environed as they have been with these prejudices, yet have they not desisted from the enterprize; but rather than so noble and illustrious an undertaking should not proceed for want of some generous and industrious spirits to promote the work, they have themselves submitted to those mean employments of digging

in the very quarry; yea, even of making brick where there was no straw but what they gleaned, and lay dispersed up and down; nor did they think their pains yet ill bestowed, if, through the aſsiduous labour and a train of continual experiments, they might at last furnish, and leave solid and uncorrupt materials to a ſucceeding and more grateful age, for the building up a body of real and substantial philoſophy, which should never ſuccumb to time, but with the ruins of nature, and the world itself.

In order to this, how many, and almost innumerable, have been their trials and experiments, through the large and ample field both of art and nature! we call our journals, registers, correspondence, and transactions to witneſs; and may, with modesty, provoke all our systematical methodists, natural historians, and pretenders, hitherto extant from the beginning of letters to this period, to show us so ample, so worthy, and so useful a collection. It is a fatality and an injury to be deplored, that those who give us hard words, will not first vouchsafe impartially to examine these particulars, since all ingenuous spirits could not but be abundantly satisfied, that this illustrious aſsembly has not met so many years purely for speculation only; though I take even that to be no ignoble culture of the mind, or time mispent, for persons who have ſo few friends, and slender obligationss to those who should patronize and encourage them: but they have aimed at greater things, and greater things produced. By emancipating and freeing themselves from the tyranny of opinion, delusory and fallacious shows, they receive nothing upon trust, but bring all things to the Lydian touch; make them paſs the fire, the anvil and the file, till they come forth perfectly repurged, and of consistence. They are not hasty in pronouncing from a single, or incompetent number of experiments, the ecstatic Ευρηκα, and offer hecatombs; but, after the most diligent scrutiny, and by degrees, and wary inductions honestly and faithfully made, record the truth and event of trials, and transmit them to posterity. They resort not immediately to general propositions upon every specious appearance, but stay for light and information from particulars, and make report *de facto*, and as sense informs them. They reject no sect of philosophers, no mechanic helps, except no persons of men; but cheerfully embracing all, cull out of all, and alone retain what abides the test; that, from a plentiful and well-furnished magazine of true experiments, they may in time advance to solemn and established axioms, general rules and maxims; and a structure may

indeed lift up its head, such as may stand the shock of time, and render a solid account of the phænomena and effects of nature, the aspectable works of God, and their combinations; so as, by causes and effects, certain and useful consequences may be deduced: Therefore they do not fill their papers with transcripts out of rhapsodists, mountebanks, and compilers of receipts and secrets, to the loss of oil and labour; but, as it were eviscerating nature, disclosing the resorts and springs of motion, have collected innumerable experiments, histories, and discourses, and brought in specimens for the improvement of Astronomy, Geography, Navigation, Optics; all the parts of Agriculture, the Garden, and the Forest; Anatomy of Plants and Animals; Mines and Ores; Measures and Equations of Time by accurate Pendulums and other Motions; Hydro and Hygro-Statics, divers Engines, Powers, and Automata; with innumerable more luciferous particulars subservient to human life; of which Dr. Glanvil has given an ample and ingenious account in his learned essay, and since in the posthumous works of Dr. Hooke, lately published by the most obliging Mr. Waller, already mentioned.

This is, reader, what they have done, and they are but part of the materials which the Society have hitherto amassed and prepared for this great and illustrious work; not to pass over an infinity of solitary and loose experiments subsidiary to it, gathered at no small pains and cost: for so have they hitherto borne the burden and heat of the day alone; sapping and mining to lay the foundation deep, and raise a superstructure, to be one day perfected by the joint endeavours of those who shall, in a kinder age, have little else to do, but the putting and cementing of the parts together, which, to collect and fit, have cost them so mush solicitude and care. Solomon indeed built the glorious Temple, but it was David provided the materials. Did men in those days insolently ask, What had he done in all the time of that tedious preparation? I beseech you, what obligation has the Royal Society to render an account of their proceedings to any who are not of the body, especially when they carry on the work at their own expence amidst so many contradictions? It is an evil spirit, and an evil age, which, having sadly debauched the minds of men, seeks with industry to blast and undermine all attempts and endeavours that signify to the illustration of truth, the discovery of imposture, and its sandy foundation.

"Those who come," says the Noble Verulam, "to inquire after "knowledge, with a mind to scorn, shall be sure to find matter for "their humour, but none for their inſtruction." Would men bring light of invention, and not fire-brands of contradiction, knowledge would infinitely increase. These are the Sanballats and Horonites who disturb our men upon the wall; but let us rise up and build, and be no more discouraged. Nehem. ii. 19. It is impoſsible to conceive how so honest and worthy a design should have found so few promoters, and so cold a welcome in a nation whose eyes are so wide open. We see how greedily the French and other strangers embrace and cultivate the design: What sumptuous buildings, well-furnished observatories, ample appointments, salaries, and accommodations have they erected to carry on the work, whilst we live precariously, and spin the web out of our own bowels! Indeed, we have had the honour to be the first who led the way, and raised the spark, which, like a train, has taken fire and warmed the regions all about us. This glory, doubtleſs, shall none take from us; but, whilst they flourish so abroad, we want the spirit that should diffuse it here at home, and give progreſs to so hopeful a beginning: But, as we said, the enemy of mankind has done us this despite; it is his interest to impeach, in any sort, whatever opposes his dominion, (which is to lead and settle men in errors, as well in arts and natural knowledge as in religion,) and therefore would be glad the world should still be groping after both. It is he that sets the buffoons and empty sycophants to turn all that is great and virtuous into raillery and derision: It is therefore to encounter these, that, like those resolute builders, whilst we employ one hand in the work, we, with the other, are obliged to hold our weapon till some bold and gallant genius deliver us, and raise the siege. Nehem. iv. 17.

How great a name would such a benefactor establish! What a constellation would he make! How gloriously would he shine! For mine own part, religiously I profeſs it, were I not a person, who (whilst I stood expecting, when others more worthy and able than myself should have snatched the opportuity of signalizing a work worthy of immortality) had long since given hostages to fortune, and so put myself out of a capacity of showing my affection to a design so glorious, I would not only most cheerfully have contributed towards the freeing the Society from the straits it has so long struggled under, but sacrificed all my secular interests in their service. That glory, however, is reserved for the gallant hero, whoever he be, who, truly weighing the noble and universal consequence

of so high an entsrprize, shall at last free it of these reproaches, and either set it above the reach of envy, or convert it to emulation.

This were indeed to consult an honest fame, and to embalm the memory of a greater name than any has yet appeared amongst all the benefactors of the disputing sects. Let it suffice to affirm, that, next to the propagation of our most Holy Faith and its appendants, (nor can his Majesty or the nation build their fame on a more lasting or a more glorious monument, the propagation of learning and useful arts having always survived the triumphs of the proudest conquerors and spillers of blood,) Princes have been more renowned for their civility to arts and letters, than to all their sanguinary victories, subduing provinces, and making those brutish desolations in the world to feed a savage and vile ambition.

Is not our Royal Founder already panegyrized by all the universities, academists, learned persons, divers princes, ambaſsadors, and illustrious men from abroad? Witneſs the many accurate treatises and volumes on the most curious and useful subjects, medicinal, mathematical, and mechanical, dedicated to his Majesty as Founder, to the President, and to the Society, by the greatest wits and most profoundly knowing of the European world, celebrating their institution and proceedings: Witneſs the daily submiſsions and solemn appeals of the most learned strangers to their suffrages, as to the most able, candid, and impartial judges: Witneſs the letters and correspondences from most part of the habitable earth, East and West-Indies, and almost from Pole to Pole; besides what they have received from the very mouths of divers profeſsors, public ministers, great travellers, noblemen, and persons of the highest quality, who have not only frequented the aſsembly, but desired to be incorporated and inscribed into their number; so little has his Majesty or the kingdom been diminished in their reputation by the Royal Society, to the reproach of our sordid adversaries.

Never had the Republic of Letters so learned and universal a correspondence as has been procured and promoted by this Society alone, as not only the casual transactions of several years, filled with instances of the most curious and useful observations, make appear; but, as I said, the many nuncupatory epistles to be seen in the fronts of so many learned volumes. There it is you will find Charles the Second placed among the heroes and demi-gods, for his patrociny and protection. There you will

see the numerous congratulations of the most learned foreigners, celebrating the happineſs of our institution; and that whilst other nations are still benighted under the dusky cloud, such a refulgent beam should give day to this bleſsed isle: And, certainly, it is not to be supposed that all these learned persons, of so many and divers interests as well as countries, should speak and write thus out of flattery, much leſs out of ignorance, being men of the most refined universal knowledge, as well as ingenuity; but I should never end were I to pursue this fruitful topic.

I have but one word more to add to conciliate the favour and esteem of our own Universities to an aſsembly of gentlemen, who, from them, acknowledge to have derived all their abilities for these laudable Undertakings: Whatever is shining in them of most Christian, moral, and otherwise conspicuous, they confeſs as derived from that source and fountain, to which, on all occasions, they are not only ready to pay the tribute and obsequiousneſs of humble servants, but of sons and dutiful alumni. There is nothing verily which they more desire than a fair and mutual correspondence between so near relations, and that they may be perpetually flourishing and fruitful in bringing forth, as they still do, supplies to Church and State in all its great capacities*. Finally, that they would regard the Royal Society as a colony of their own planting, and augur its succeſs: And if, in these labours and arduous attempts, several inventions of present use and service to mankind (either detecting errors, illustrating and aſserting truths, or propagating knowledge in natural things, and the visible works of God,) have been discovered; as they envy not the communicating them to the world, so should they be wanting to the Society, and to the honour of divers learned and ingenious

* Since this Epistle was first written and published, the University of Oxford has instituted and erected a Society for the promoting of Natural and experimental Knowledge in concert with the Royal Society, with which they keep a mutual correspondence. This I mention, for that some malevolents had so far endeavoured to poſseſs divers Members of the University, as if the Society designed nothing leſs than the undermining of that and other illustrious academies, and which indeed so far prevailed, as to breed a real jealousy for some considerable time; but as this was never in the thoughts of the Society, which had ever the Universities in the greatest veneration, ſo the innocency and usefulneſs of its institution has at length disabused them, vindicated their proceedings, diſsipated all furmises, and, in fine, produced an ingenuous, friendly, and candid union and correspondence between them.

persons, who are the soul and body of it, not to vindicate them from the ambitious plagiary, the insults of scoffers and injurious men. Certainly, persons of right noble and subacted principles, who are lovers of their country, should be otherwise affected, and rather strive to encourage and promote endeavours tending to so generous a design, than decry it; especially when it costs them nothing but their civility to so many obliging persons, though they should hitherto have entertained them but with some innocent diversions. To conclude, we envy none their dues; nay, we gratefully acknowledge any lights which we receive either from home or from abroad; we celebrate and record the names of those who give them amongst our benefactors; recommend them to the public; and what we thus freely give, we hope as freely to receive.

Thus have I endeavoured to vindicate the Royal Society from some aspersions and encroachments it hitherto has suffered, and showed under what weights and prefsure this palm does still emerge; and if for all this I fall short of my attempt, I shall yet have this satisfaction, that though I derive no glory from my own abilities, sensible of my great defects, I shall yet deserve their pardon for my zeal to its prosperity.

ΦΙΛΟΣΟΦΙΑΣ ἐπιθυμεῖς; παρασκευάζε αὐτόθεν, ὡς καταγελασθησόμενος, ὡς καταμωκησομένων σε πολλῶν ὡς ἐρύνλων, ὅτι ἄφνω φιλοσωφος ἡμῖν ἐπανελήλυθε, καὶ πόθεν ἡμῖν αὕτη ἡ ὀφρύς; συ δὲ ὀφρὺν μὲν μὴ σχῆς· τῶν δὲ βελτίσων σοι φαινομένων ὕτως ἔχε, ὡς ὑπὸ τῦ Θεῦ τεταγμένος εἰς ταύτην τὴν τάξιν· μέμνησο δὲ ὅτι ἐὰν μὲν ἐμμείνῃς τοῖς αὐτοῖς, οἱ καταγελῶνλές σε πρότερον, ὕστοί σε ὕστερον θαυμάσονται· ἐὰν δὲ ἡττηθῇς αὐτῶν, διπλῶν προσλήψῃ καταγέλωτα.——EPICTETUS.

TRANSLATION.

If you resolve to make wisdom and virtue the study and businefs of your life, you must be sure to arm yourself before-hand against all the inconveniencies and discouragements that are like to attend this resolution. Imagine that you shall meet with many scoffs, and much derision; and that people will upbraid you with turning philosopher all on the sudden; and ask in scorn, What is the meaning of all this affected gravity, and these disdainful looks? But be not you affected, or supercilious, only stick close to whatever you are in your judgment

convinced is virtuous and becoming; and consider this as your proper station, assigned you by God, which you must not quit upon any terms. And remember, that if you persevere in goodness, those very men, who derided you at first, will afterwards turn your admirers: But if you give way to their reproaches, and are vanquished by them, you will then render yourself doubly, and most deservedly ridiculous."——STANHOPE.

"Some men, like Lucian in religion, seek, by their wit, to traduce "and expose useful things, because, to arrive at them, they converse "with mean experiments; but those who despise to be employed in "ordinary and common matters, never arrive at solid perfection in "experimental knowledge."——LORD VERULAM.

J. EVELYN.

ADVERTISEMENT.

As I have frequently inserted divers historical and other paſsages, apposite and agreeable to the subject, abstaining from a number more which I might have added, let it be remembered that I did not altogether compile this work for the sake of our ordinary rustics, mere foresters and woodmen, but for the benefit and diversion of gentlemen and persons of quality, who often refresh themselves in these agreeable toils of planting and gardening: for the rest I may perhaps in some places have made use of here and there a word, not as yet so familiar to every reader; but none, that I know of, which are not sufficiently explained by the context and discourse. That this may yet be no prejudice to the meaner capacities, let them read for

Ablaqueation, laying bare the roots.
Amputation, cutting quite off.
Arborator, pruner, or one that has care of the trees.
Avenue, the principal walk to the front of the house or seat.
Bulbs, round or onion-shaped roots.
Calcine, burn to ashes.
Compost, dung.
Conservatory, green-house to keep choice plants in.
Contr' Espalier, a palisade, or pole-hedge.
Coronary Garden, flower-garden.
Culinary, belonging to the kitchen, roots, salading, &c.
Culture, dreſsing.
Decorticate, to strip off the bark.
Emuscation, cleansing it of the moſs.
Esculent, roots, salads, &c. fit to eat.
Espaliers, wall-fruit trees.
Exotics, outlandish, rare and choice.
Fermentation, working.

Fibrous, stringy.
Frondation, stripping off leaves and boughs.
Heterogeneous, repugnant.
Homogeneous, agreeable.
Hyemation, protection in winter.
Ichnography, ground-plot.
Inoculation, budding.
Incision, graffing.
Insolation, exposing to the sun.
Interlucation, thinning and diſbranching of a wood.
Irrigation, watering.
Laboratory, still-house.
Letation, dung.
Lixivium, lee.
Mural, belonging to the wall.
Olitory, belonging to the kitchen-garden.
Palisade, pole-hedge.
Parterre, flower-garden, or knots.
Perennial, continuing all the year.
Quincunx, trees set like the cinque-point of a die.
Rectify, re-distil
Seminary, nursery.
Stercoration, dunging.
Tonsile, that which may be shorn or clipped.
Topiary-Works, the clipping, cutting, and forming of hedges, &c. into figures and works.
Vernal, belonging to the spring.

The rest are obvious.

ΕΙΣ ΤΗΝ ΤΟΥ ΠΑΤΡΟΣ

ΔΕΝΔΡΟΛΟΓΙΑΝ.

Ὑμνήσω φρονίμοιο πάλρός μελέεσσιν ἐπαίνως
Ὑμνήσω ἐπέεσσιν ἀρισεύονλα γεωργῶν.
Ὀυρανίην ταναῆς ἀρετὴν δρυὸς αὐτὸς ἔγραψεν,
Καὶ ποταπῶν γενεὴν δένδρων κατα δάσκιον ὑλήν.
Ἀθανάτων κύδισος ἣν νεφεληγερέτα Ζεὺς,
Ἔςχεν δὴ δένδροιο φίλαις πραπίδεσσιν ἔελδωρ,
Φύλλοις τ' ἀμβροσίοις θαλερᾶς δρυὸς ἐςεφάνωτο.
Ἀγλιακῶν ὃς ἄρισος ἦν θεοείκελος ἀνὴρ,
Ἰσορίην δένδρων τελεσεν φρέσι κυδάλιμοισι,
Ὑλογενὴς, κηπυρὸς, ὑπείροχος, ὃς μέγ' ὄνειαρ
Ἀνδράσιν ἐσσομένοις καλὰ γαίην πυκνοβότειραν,
Νησί τε ποντοπόροισι βαρυγδούποιο θαλάσσης.

JO. EVELYN, FIL.

SILVA:

OR,

A DISCOURSE OF FOREST-TREES,

AND

THE PROPAGATION OF TIMBER IN HIS MAJESTY'S DOMINIONS, &c.

Tuque ades, inceptumque una decurre laborem,
O decus, ô famæ meritó pars maxima nostræ,
Carolide, pelagoque volans da vela patenti:
Da facilem cursum, atque audacibus annue cœptis;
Ignarosque viæ mecum miseratus agrestes,
Ingredere, et votis jam nunc aſsuesce vocari.

THE INTRODUCTION.

INTROD.

1. 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 accident, the present navy shall be worn out and impaired; it has been a very worthy and seasonable advertisement in the honourable the principal Officers and Commiſsioners, what they have lately suggested to this illustrious Society for the timely prevention and redreſs of this intolerable defect. For it

INTROD. 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 through that prodigious havoc made by such as lately profeſsing themselves against root and branch, (either to be reimbursed their holy purchases, or for some other sordid respect,) were tempted not only to fell and cut down, but utterly to extirpate, demolish, and raze, as it were, all those many 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 so 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 [a].

[a] In order to trace the history of the decay of our forest trees, it will be neceſsary to remark, that the first attack made upon them, of any material conſequence, was in the 27th year of the reign of Henry VIII. when that monarch seized upon the church-lands, and converted them, together with their woods, to his own uſe. Ruinous as ſuch an attempt might appear at first, it did not bring with it any very pernicious consequences, as the whole kingdom, at that early period, was plentifully stocked with all kinds of timber trees, especially the Oak. During the Civil War, which broke out in 1642, and all the time of the Inter-regnum, the Royal Forests, as well as the Woods of the Nobility and Gentry, suffered a great calamity; insomuch that many extensive forests had, in a few years, hardly any memorial left of their existence but their names. From that period to the present, there is some reason to apprehend that the persons appointed to the superintendence of the Royal Forests and Chases have not strictly and diligently attended to their charge, otherwise the nation would not at this day have reason to complain of the want of Oak, for the purposes of encreasing and repairing the Royal Navy. This loſs, however, would not have operated so severely, had the principal Nobility and Gentry been as solicitous to plant, as to cut down their woods. But this reflection should be made with some degree of limitation, as several thousand acres of waste land have, within these twenty years, been planted for the benefit of the rising generation. The Society of Arts, &c. established in London in the year 1754, have greatly contributed, by their honorary and pecuniary premiums, to restore the spirit for Planting; and I flatter myself, that a republication of Mr. Evelyn's Silva will also contribute to that most desirable end. Tuſser, a versifier in the reign of Henry the Eighth, complains, at that early period, "that men were more studious to cut down than to plant trees:" And as this author is often quoted by Mr. Evelyn, it will be proper to remark that his book is entitled *Five hundred Points of Huſbandry*, and is printed in black letter. It is written in quatrains, or stanzas, of four verses each, and contains

2. To attend now a spontaneous supply of these decayed materials (which is the vulgar and natural way) would cost (besides the inclosure) some entire ages repose of the plough *, though bread indeed doth require our first care: therefore the most expeditious and obvious method would doubtleſs be one of these two ways, sowing or planting. But, first, 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 our woods has been so universal, that I conceive nothing leſs than an universal plantation of all the 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. INTROD.

* Patricius De Repub.

3. And first, by trees here, I consider principally for the *Genus generaliſsimum*, such lignous and woody plants as are hard of substance, pro-

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more lines than Virgil's Georgics. The first edition was published in 1562. There are other editions in 1604, and 1672; also in 1710, and 1743, with notes and observations.—Every thing that has a tendency towards the raising and diffusing a spirit for planting, is highly meritorious; and as our Wooden Walls have been esteemed, for many ages past, the bulwarks of this nation, we may hope from the goodneſs of our AUGUST SOVEREIGN, that he will set an example to the nobility and men of large poſseſsions, by ordering his wastes to be planted with Timber-trees, especially the Oak:

> ——————————nourish there
> Those sapling Oaks, which at Britannia's call,
> May heave their trunks mature into the main,
> And float the bulwarks of her liberty. MASON.

The wants of the nation call for this supply. How many thousand acres of waste land are there in this kingdom, that at this present time produce nothing, but may be profitably improved by planting! Did men of large poſseſsions but rightly consider this, they would careſully look over their estates, search out every uſeleſs bog, and plant it with Poplars or other aquatics. They would examine all the waste grounds, and set apart some for the cottagers, and apply the most barren and uſeleſs for plantations. Was such a generous spirit to prevail, we should hear few persons complaining that their antient Common-rights are invaded, and that their extreme neceſsities have obliged them to emigrate to countries far leſs hospitable than their own.

INTROD. cere of stature; that are thick and solid, and stiffly adhere to the ground on which they stand [b]. These we shall divide into the greater and more

[b] A Tree is defined to be a perennial plant, which rises to a very great height, with a simple, woody, and durable Stem, or Trunk. By these characters Trees are distinguished, with great accuracy, from Herbs, whose stems are frequently compound, herbaceous, or succulent, and die down to the root every year. It is evident from the characters just enumerated, that all trees are perennial. Herbs are either annual, that is, of one year's duration; or biennial, of two: those only are perennial, whose roots, not perishing with the stems, continue a long time under the surface of the ground, and put forth a new stem every year. Upon these obvious and striking differences was founded the very ancient division of vegetables into herbs and trees; though, perhaps, that distinction was principally suggested by the difference of size and duration of the plants in question. Be that as it may, the division has been esteemed so natural and spontaneous, that, from the time of Aristotle and Theophrastus to the present age, it has obtained a principal place in almost every system, except that of Linnæus, which mixes herbs, shrubs, and trees promiscuously together. But this is evidently to preserve the harmony of his system, which is solely founded on the fructification of every individual Genus and Species. We may therefore easily discover the reason of Linnæus's overlooking every other idea that did not fall in with his own, and of his affirming, that, in this particular, Nature has put no limits between trees and shrubs. Among the celebrated names in botany, which have retained the ancient distinction, are numbered Cæsalpinus, the Father of Systematic Botany; Morison, Hermannus, Christopher Knaut, Boerhaave, Ray, Pontedera, and Tournefort. The latter, rather than admit a division, through custom become necessary, chose to hurt the elegance and uniformity of his plan; and, in fact, spun out into twenty-two classes, what, without such division, might have been easily comprised in seventeen. On the opposite side are ranged Rivinus, Christian Knaut, Linnæus, Ludwig, and other names of less note. The distinction into Trees and Shrubs, though of equal antiquity, is neither so obvious, nor are its limits so accurately ascertained. In fact, of the numerous characteristic differences which have been suggested by botanical writers, not one is perfectly satisfactory. To say with Tournefort, that trees are universally taller than shrubs, is, in effect, saying nothing, unless a certain fixed, immutable standard were previously established. Besides every thing respecting dimension is so variable in its nature, and depends so much upon difference of climate, soil, and management, that were a standard of this kind attempted to be established, the greatest confusion would ensue; and the same plant in different countries, and even in opposite soils in the same country, would receive different appellations, according as it exceeded, or came short of the given standard. Thus the *ricinus*, or palma Christi; the dwarf rosebay, *rhododendron;* the strawberry-tree, *arbutus;* and several others, which grow to the size of very large trees in warm climates, are, in this country, equalled and even exceeded in height by many of our smallest shrubs. The difference of soil and culture in the same climate, produces a like diversity in dimension. Thus, to take an example from herbaceous vegetables, the marigold, which, in a fat and moist

ceduous, fruticant and shrubby; feras and wild; or more civilized and domestic; and such as are sative and hortensial subalternate to the other; but of which I give only a touch, distributing the rest into these two clafses, the dry and the aquatic; both of them applicable to the same civil uses of building, utensils, ornament, and fuel: for to dip into their medicinal virtues is none of my province, though I sometimes glance at them with due submifsion, and in few instances [c].

4. Among the Dry, I esteem the more principal and solid to be, the Oak, Elm, Beech, Ash, Chesnut, Walnut, &c. the lefs principal, the Service, Maple, Lime-tree, Horn-beam, Quick-beam, Birch, Hafel, &c. together with all their subalternate and several kinds:

> Sed neque quam multæ species, nec nomina quæ sint,
> Est numerus; neque enim numero comprendere refert:
> Quem qui scire velit, Lybici velit æquoris idem
> Difcere, quam multæ Zephiro turbentur arenæ. VIRG. GEORG. ii.
>
> I pafs the rest, whose ev'ry race and name,
> And kinds are lefs material to my theme:
> Which who would learn, as soon may tell the sands,
> Driv'n by the western winds on Lybian lands.

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earth, rises two feet high, scarce exceeds the same number of inches in a dry and gravelly soil. The learned Dr. Alston, in his *Tyrocinium Botanicum*, wishes to consider the distinction into Trees and Shrubs, as a true natural distinction, and endeavours to trace its foundation in the internal structure of the plants themselves. All trees, says he, whether they bear buds or not, are covered with two barks, the outer and inner, called by botanists *cortex* and *liber*. Shrubs differ from herbaceous vegetables in the duration of their stems; from trees in the nature of their covering, which is not a bark, but a cuticle or simple skin. This thought is ingenious; but the fact on which it depends is not sufficiently ascertained. The farther distinction into shrubs and under-shrubs, which is exceedingly arbitrary and indeterminate, was first suggested by Clusius, in a work entitled, *Rariores et Exoticæ Plantæ*, published in 1576; and afterwards adopted by Cæsalpinus, and others.

[c] In this Mr. Evelyn imitates Virgil, who, in a few instances, gives the medicinal virtues of trees and shrubs:

> Ipsa ingens arbos, faciemque simillima Lauro:
> Et, si non alium late jactaret odorem,
> Laurus erat: folia haud ullis labentia ventis:
> Flos apprima tenax: animas et olentia Medi
> Ora fovent illo, et senibus medicantur anhelis. GEORG. lib. ii. l. 131.

INTROD.

5. Of the Aquatical, I reckon the Poplars, Asp, Alder, Willow, Sallow, Osier, &c. Then I shall add a word or two for the encouragement of the planting of fruit-trees, together with some leſs vulgar, but no leſs useful trees, which, as yet, are not endenizoned amongst us, or, at least, not much taken notice of; and, in pursuance hereof, I shall observe this order: First, to show how they are to be raised, and then cultivated. By raising, I understand the seed and the soil; by culture, the planting, fencing, watering, dreſsing, pruning, and cutting: of all which briefly.

6. And first for their raising: Some there are

Spring of themſelves, unforc'd by human care;
——nullis hominum cogentibus, ipsæ sponte sua veniunt————

Specified according to the various disposition of the air and soil

Some from their seeds arise;
Pars autem posito surgunt de semine:

As the Oak, Chesnut, Ash, &c.

Some to thick groves from their own roots do spring;
Pullulat ab radice aliis densiſsima sylva;

As the Elm, Alder, &c. And others

Grow without root;
Nil radicis egent————

As Willows, and all the vimineous kinds, which are raised by sets only.

These ways first Nature gave.
Hos natura modos primùm dedit.

And all this the immortal Poet has so elegantly and comprehensibly described, as I cannot paſs:

Principio arboribus varia est Natura creandis.
Namque aliæ, nullis hominum cogentibus, ipsæ
Sponte sua veniunt, camposque et flumina late
Curva tenent: ut molle siler, lentæque genistæ,
Populus et glaucâ canentia fronde salicta.
Pars autem posito surgunt de semine: ut altæ
Castaneæ, nemorumque Jovi quæ maxima frondet
Æsculus, atque habitæ Graiis oracula quercus.

Pullulat ab radice aliis densiſsima sylva:
Ut cerasis, ulmisque: etiam Parnaſsia laurus
Parva sub ingenti matris se subjicit umbrâ.
Hos natura modos primùm dedit: his genus omne
Sylvarum fruticumque viret, nemorumque sacrorum.
Sunt alii, quos ipse viâ sibi repperit usus. VIRG. GEORG. ii.

Some trees their birth to bounteous Nature owe:
For some without the pains of planting grow.
With Osiers thus the banks of brooks abound,
Sprung from the wat'ry genius of the ground:
From the same principles grey Willows come;
Herculean Poplar, and the tender Broom.
But some from seeds inclos'd in earth arise:
For thus the mast-ful Chesnut mates the skies.
Hence rise the branching Beech, and vocal Oak
Where Jove of old oraculously spoke.
Some from the root a rising wood disclose;
Thus Elms, and thus the salvage Cherry grows.
Thus the green Bays, that binds the poet's brows,
Shoots, and is shelter'd by the mother's boughs.
These ways of planting Nature did ordain,
For Trees and Shrubs, and all the Sylvan reign.
Others there are, by late experience found:——

Thus we see there are more ways to the wood than one, and Nature has furnished us with variety of expedients.

7. And here we might fall into a deep philosophical research, whether the Earth itself in some place thereof or other, even without seed, branch or root, &c. would produce every kind of vegetable, as it manifeſtly does divers sorts of graſs and plants; viz. the Trefoil, or Clover, in succulent land; in dry ground, May and Ragweeds; in the very moist, Ros solis, Argentina, Flags, &c.; and in the very barren, Fern, Broom, Heath, &c. So Virgil notes sterile places for the Pitch-tree[d]; we our wet and uligi-

[d] Virgil, with great judgment, describes sterile grounds, by enumerating the plants that naturally grow in such places: There,

——————piceæ tantum taxique nocentes
Interdum, aut hederæ pandunt vestigia nigræ. GEORG.

Mr. Bell in his "Journey from St. Petersburg to Ispahan" remarks, that those places in the country of the TONGUSI, on which the Scotch Fir naturally grows, are always fruitful

INTROD.

nous, for the Birch, Alder, &c. The more lofty, poor, and perflatile, for Yew, Juniper, Box, and the like. And we read in the natural histories of divers countries, that the Cedar, Palmetos, Queen-Pines, Ebony, Nutmeg, Cinnamon, &c. for trees; the Tulip, Hyacinth, Crocus, &c. for flowers; are sometimes, and in some regions, Aborigenes, descended immediately from the genius of the soils, climate, sun, shade, air, winds, the water, nitrous salts, rocks, banks, shores, and (like the Negroes-heads in Barbadoes) as some imagine, even without seed, or at least any perceptible rudiment. Let it not then be imputed an impertinent digreſsion, if, upon this occasion of spontaneous and æquivocal productions[c], we men-

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in corn; but where the Pitch-tree is seen, the land is barren. *Vol. I. p.* 232.——And Dr. Douglaſs, in his "Historical and Political Summary of the British Settlements in North America," says that the quality of the lands in New England is thus known by the produce. "In the best lands are Chesnuts and Walnuts, next is Beech and White Oak, lower is Fir, then Pitch Pines, then Whortles, or Huckleberry Plains; lastly, some marshy Shrubs, low and imperfect, being the lowest degree of *Suffrutex* vegetation." *Vol. II. p.* 215.

[c] It is no wonder that some should suppose vegetables capable of being produced without their parent seeds, when it was once held as a reasonable doctrine that animals, such as maggots, flies, &c. might be generated by putrefaction. We are taught by glaſses, that all animals, however minute, are organized; and we have convincing proofs that they are also regulated by the same general laws that direct the œconomy of the larger animals. Could putrefaction give birth to an organized animal, the order of Nature, established at the beginning of the world, would by this time have been overturned, and scarce one species of animals or plants which were the objects of Solomon's attention, would at this day be visible upon the face of the earth. A Horse might as well spring from a dunghill as a Fly, and the brawny Oak might as readily be produced by a ferment in the earth, as the Trefoil and Ragweed described by Mr. Evelyn. Before putrefaction can produce the greater wonder, it must be able to produce the leſser; and who ever saw a repeating watch, or a musical clock, created by the ferment of a dunghill!

——————— nil semine egeret:
E mare primum homines, e terra poſset oriri
Squammigerúm genus, et volucres; erumpere cœlo
Armenta, atque aliæ pecudes; genus omne ferarum
Incerto partu culta, ac deserta teneret:
Nec fructus iidem arboribus constare solerent,
Sed mutarentur: ferre omnes omnia poſsent. LUCRET. lib. i. l. 162.

This doctrine of spontaneous, or equivocal generation, was originally invented in Egypt, with a view to solve the phænomenon of the numerous swarms of flies and insects that were generated upon the surface of the mud left by the waters of the Nile.

tion how that inveterate dispute, which has exercised so many Naturalists and Philosophers (about Miſleto) has lately been decided by an evident experiment, and the testimony of the most curious and learned Botanists, by the seeds of that excrescence; which being inserted into an hole made in the bark of the White Poplar, produces the plant which has hitherto raised so many years controversy[f]. *(See Mr. Ray's Hist. Plant. p.* 1583; and *Appendix, p.* 1918.)

[f] The mistletoe, instead of rooting and growing in the earth, like other plants, fixes itself and takes root on the branches of trees. It spreads out with many branches and forms a large bush. It is commonly found upon the white thorn, the apple, the crab, the ash, and maple, but is rarely seen upon the oak; which last kind, as Mr. Ray well observes, was chiefly esteemed in medicine, owing to the superstitious honours which the antient Druids of this island paid to that plant when gathered there. This is a parasitical plant, and is always produced from seed. Some of the antients called it an excrescence on the tree, growing without seed; which opinion is now fully confuted by a number of experiments. It is the opinion of some, that it is propagated by the mistletoe thrush, which, feeding upon the berries, leaves the seeds with its dung upon the branches of the respective trees where the plant is commonly found. Others say, that as the berries are extremely glutinous, the seeds frequently stick to the beaks of those birds, which being rubbed off upon the branches of trees, they become inoculated, as it were, and take root. In the same manner the mistletoe may be propagated by art; for if the berries, when full ripe, be rubbed upon the smooth part of the bark of some trees, they will adhere closely, and produce plants the following winter. In the garden belonging to the late Mr. James Collins of Knaresbrough, there were many large plants of the mistletoe, produced in this manner upon the dwarf apple-tree: And there is at this time in my garden in York, a fine plant of mistletoe, growing upon a dwarf apple-tree, which I produced by inoculation a few years ago. Of mistletoe we have only one species growing in Europe, viz. Viscum (album) foliis lanceolatis obtusis, caule dichotomo, spicis axillaribus, Lin. Sp. Plant. 1451. *Mistletoe with blunt ſpear-shaped leaves, forked stalks, and spikes of flowers rising from the wings of the stalks.* Viscum baccis albis, C. B. P. 423. *Mistletoe with white berries.*

The gathering of the mistletoe made a part of the religious worship of the Druids. When the end of the year approached, they marched with great solemnity to gather it, in order to present it to Jupiter, inviting all the world to aſsist at the ceremony in these words: "The new year is at hand, gather the mistletoe." The sacrifices being ready, the priest ascended the oak, and with a golden hook cut off the mistletoe, which was received in a white garment spread for that purpose. This part of the ceremony being ended, the victims, two white bulls that never had been yoked, were brought forth and offered up to the Deity, with prayers that he would prosper those to whom he had given so precious a boon. Of the mistletoe, thus gathered, they made a potion which they administered as an antidote to all poisons, and used as a remedy to prevent sterility. Besides the mistletoe, the Druids ritually gathered the Selago, or *Firr Club-moſs*, and the Samolus, or *Round-leaved Water Pimpernel*, both which they applied to medicinal purposes. It may here be

INTROD. But, after all this, there are who suppose some previous seminal disposition to be lurking, and dispersed in every part of the earth (in what moleculæ, or subtile contexture, they cannot discover) which though haply not at first so perfect as the maturer seeds of their after peculiar plants; yet such as are fit for the sun and influences to operate on, till they have prepared, discuſsed, and excited the seminal and prolific virtue to exert itself and awake out of sleep, in which they lie as in their causes, freeing themselves from those impediments which hindered their specification and nativity. This conception the learned Gaſsendus would illustrate by the latent fire in flints, which never betrays itself till it be

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remarked, that the Druids, in several of their religious ceremonies, had a delicacy superior to most of the antients; for in gathering the mistletoe they always used a golden hook: whereas, among other nations, a hook of braſs was thought good enough for the like purposes:

Falcibus et meſsæ ad lunam quæruntur ahenis
Pubentes herbæ,———— ÆN. lib. iv.

Partim succidit curvamine falcis aënae. OVID. MET. lib. vii.

In Sophocles, Medea is described as gathering her magic herbs with a brazen hook, and afterwards putting their juice into brazen pots.———Virgil, with great poetical elegance, compares the golden bough to the mistletoe, on account of its being an adventitious plant, and of a golden colour:

Quale solet Sylvis brumali frigore viscum
Fronde virere nova, quod non sua seminat arbos,
Et croceo fœtu teretes circumdare truncos.
Talis erat species auri frondentis opacâ
Ilice; sic leni crepitabit bractea vento. ÆN. lib. vi. l. 205.

The story of the golden bough shows that the Druids were not singular in attributing great magical powers to scarce and beautiful plants, ritually gathered, and offered to the Gods.:

Hoc sibi pulchra suum ferri Proserpina munus
Instituit.———— ÆN. l. 142.

Ergo alte vestiga oculis, et rite repertum
Carpe manu;———— *Ib.* l. 145.

And here it may not be improper to remark, that antient customs are a considerable time before they can be effaced, even in countries that have experienced the calamities of conquest; for in France, as Keysler informs us, something of the Druidical ceremonies, relative to the mistletoe, subsists in the province of Aquitain. "In Aquitania quotannis "Prid. Kal. Jan. pueri atque adolescentes vicos, villasque obeunt, carmine stipem "petentes, sibique, atque aliis pro voto, in exordio novi anni acclamantes, AU GUY! "L'AN NEUF!"

forced out by collision: but which yet, methinks, does not so fully enlighten this hypothesis, which we only mention: for the design of this discourse is not to persuade men to sit still, and let Nature work alone, but to aid and assist her as much as they are able, from seeds and plants already perfected, and qualified for more speedy propagation. It is not in any sort my meaning throughout this discourse, as if (where I speak of spontaneous productions) I believed that any vegetables raised themselves without some predisposed qualified seed or principle: But by *spontaneous*, I understand such trees and plants as were not sown or cultivated by human industry: as most of our forest-trees never were, and yet had their original from perfect seeds. And if I think the same of all animals, even to the minutest worm and insect, there are so many learned persons and experiments to justify it, that I need say no more. Most ingenious, in the mean time, is what some, upon an accurate and narrow guess, have not feared to pronounce; namely, that all planting by seed was but a kind of inoculation; and propagation by cions and sprouts, but a subterranean graffing. And upon this account I am the more willing to assent, that, in removing of wild trees taken out of incumbered places, (so it be performed with all due circumstances) there may happen considerable improvements; since as there is something in super-graffing, or the repetition of graffing, for the enlargement and melioration of fruit, so there may be also in a careful removal; especially the tree being of a kind apt to dilate its roots, and taken whilst those roots may be safely and entirely transferred; and likewise, because it is presumed that most trees, propagated by seeds, emit a principal root very deep into the earth, which frequently extracting but a coarser nutriment (though it may haply yield a close and firmer timber) is not yet so apt to shoot and spread, as what are by removal deprived of that root; and by being more impregnate with the sun, dews, and heavenly influences near the surface, enabled to produce larger, more delicate, and better tasted fruit; supposing nuts, mast, or berries; for we would not go out of our forest for instances: and yet even in these descents of the tap-root, it sometimes penetrating to a vein of some rich marl or other mould, the extraordinary flourishing and expedition of growth will soon give notice of it. But to make some trial of this, it were no difficult matter, when one plants a nursery or grove, to experiment what the earth, as far as the roots are like to reach, will advance and discover to us.

INTROD. 8. In the mean time, it has been stiffly controverted by some, whether it were better to raise trees for timber and the like uses, from their seeds and first rudiments; or to transplant such as we find have either raised themselves from their seeds, or sprung from the mother-roots. Now that to produce them immediately of the seed is the better way, these reasons may seem to evince.

First, Because they take soonest. *Secondly*, Because they make the straightest and most uniform shoot. *Thirdly*, Because they will neither require staking nor watering, which are two very considerable articles. And, *lastly*, For that all transplanting, (though it much improves fruit-trees) unleſs they are taken up the first year or two, is a considerable impediment to the growth of forest-trees: And though it be true, that divers of those which are found in woods, especially oaklings, young beeches, ash, and some others, spring from the self-sown mast and keys; yet being for the most part dropped, and diſseminated among the half-rotten sticks, musty leaves, and perplexities of the mother-roots, they grow scraggy, and, being over-dripped, become squalid and apt to gather moſs:

> Crescentique adimunt fœtus, uruntque ferentem. GEOR. lib. ii.
> Which checks their growth, and makes their bodies pine.

Nor can their roots expand, and spread themselves as they would do, if they were sown, or had been planted in a more open, free, and ingenuous soil. And that this is so, I do affirm upon experience, that an acorn, sown by hand in a nursery, or ground where it may be free from these incumbrances, shall in two or three years outstrip a plant of twice that age, which has either been self-sown in the woods, or removed, unleſs it fortune, by some favourable accident, to have been scattered into a more natural, penetrable, and better qualified place; but this disproportion is yet infinitely more remarkable in the Pine and the Walnut-tree, where the nut, set into the ground, does usually overtake a tree of ten years growth which was planted at the same instant; and this is a secret so generally misrepresented by most of those who have treated of these sorts of trees, that I could not suffer it to paſs over without a particular remark; so as the noble poet (with pardon for receding from so venerable authority) might be mistaken, when he delivers this observation as universal, to the prejudice of sowing, and raising woods from their rudiments:

Jam, quæ seminibus jactis se sustulit arbos,
Tarda venit, seris factura nepotibus umbram. GEOR. lib. ii.

Trees, which from scatter'd seeds to spring are made,
Come slowly on for our grand-children's shade.

And, indeed, I know divers are of this opinion; and possibly in some luckier soils, and where extraordinary care is had in transplanting and removing cumbrances, &c. there may be reason for it: But I affirm it for the most part, and find I have the suffrage of another no inelegant poet, if not in a full assent to my assertion, yet in the choice of my procedure for their perfection:

——————Quamvis ipsa de stirpe parentis
Pullulet, et tenues tollat se quercus in auras,
Aut mutata solo, ramis exsultet opacis;
Forma tamen nemoris non sit mihi gratior ulla,
Quam quod per campos, posito de semine, crevit.
Et quamquam sit agro prælongum tempus inerti
Durandum, ac tardæ surgant de semine quercus,
His tamen, his longe veniunt felicius umbræ.
Nam certum est de glande satas radicibus imis
Altius in terram per se descendere plantas:
Majoresque adeo in cœlum profundere ramos.
Seu quod dediscant mutatam semina matrem,
Degeneremque ferant alieno ex ubere prolem:
Sive quod ipsa sibi cognatæ inolescere terræ
Glans primo melius paulatim assuevit ab ortu. RAPIN. *Hort.*

——————Though suckers which the stock repair,
Will with thick branches crowd the empty air;
Or the ground-oak transplanted, boughs may shoot;
Yet no such grove does with my fancy suit,
As what from acorns set on even rows,
In open fields at their due distance grows.
What though your ground long time must fallow lie,
And seedling-oaks yield but a slow supply?
No walks else can be for like beauty prais'd:
For certain 'tis that plants from acorns rais'd,
As to the centre deeper fibres spread,
So to the zenith more advance their head:
Be it that plants for natural moisture pine,
And as expos'd, at change of soil decline;
Or that the acorn with its native mould,
Does thrive and spread, and firm alliance hold.

DENDROLOGIA.

BOOK THE FIRST.

CHAPTER I.

Of the Earth, Soil, Seed, Air, and Water.

EARTH.

1. IT is not my intention here to speak of Earth, as one of the common reputed elements, of which I have long since published an ample account in an expreſs treatise[g], which I desire my reader to peruse, since it might well commute for the total omiſsion of this chapter, did not method seem to require something briefly to be said. And first, as to that of Earth, we shall need at present to penetrate no deeper into her bosom than paring off the turf, scarrifying the upper mould, and digging convenient pits and trenches, not far from the natural surface, without disturbing the several strata and remoter layers, whether of clay, chalk, gravel, sand, or other succeſsive layers, and concretes foſsil, (all of them useful sometimes, and agreeable to our foresters, though few of them what one would choose before the under turf, black, brown, gray, and light, and breaking into short clods, and without any disagreeable scent, and with some mixture of marl or loam, but not clammy,) of which I have particularly spoken in that treatise.

SOIL.

2. In the mean time, this of the Soil being of great importance for the raising, planting, and propagation of trees in general, must at no hand be neglected; and is therefore, on all occasions, mentioned in almost every chapter of our ensuing discourse. I shall therefore not need to aſsign it any part, when I have affirmed in general, that most timber-

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g This valuable treatise is entitled "Terra; or a Philosophical Discourse of Earth;" and was published at the request of the Royal Society in the year 1679. It is republished at the end of this work with Notes and Observations.

trees grow and prosper well in any tolerable land which will produce corn or rye, and which is not in exceſs stony, in which nevertheleſs some trees delight, or altogether clay, which few or none do naturally affect; and yet the oak is seen to prosper in it, for its toughneſs preferred before any other by many workmen; though of all soils the cow-pasture doth certainly exceed, be it for what purpose soever of planting wood. Rather therefore we should take notice how many great wits and ingenious persons, who have leisure and faculty, are in pain for improvements of their heaths and barren hills, cold and starving places, which causes them to be neglected and despaired of; whilst they flatter their hopes and vain expectations with fructifying liquors [h], chymical

[h] The steeping of seeds in prolific liquors is not of modern invention. The Romans, who were good husbandmen, have left us several receipts for steeping of grain, in order to increase the powers of vegetation. In England, France, Italy, and in all countries where agriculture has been attended to, we see a variety of liquors recommended for the same purpose. Good nourishment has ever been observed to add strength and vigour to all vegetables. Hence it was natural to suppose that, by filling the veſsels of the grain with nourishing liquors, the germ, with its roots, would be invigorated. How far this reasoning is founded upon just principles, remains to be examined. For my part, I am not an advocate for steeps. All my experiments demonstrate that they have no inherent virtue. I have more than once sown the same seed, steeped and unsteeped, and though all other circumstances were minutely alike, yet I never could observe the least difference in the growth of the crop. I confeſs that when the light seeds are skimmed off, as in the operation of brining, the crop will be improved, and diſeaſes prevented: but theſe advantages proceed from the goodneſs of the grain sown, and not from any prolific virtue of the steep. I am happy in not being singular in my objection to steeps. Many philosophical farmers have been induced to quit their prejudices, and are now convinced from their own trials, that there is no dependence upon prolific liquors, though ever so well recommended. Some people have been hardy enough to persuade themselves, that the tillering of wheat may be so much increased by invigorating the grain, that only one half of the seed will be required. Duhamel, one of the most accurate of the experimental husbandmen, and a most excellent philosopher, speaks in the strongest terms, against the practice of steeping, so far as it supposes an impregnation of vegetative particles. I shall not here repeat his experiments: I shall only observe, that they are such as any farmer may make; they are plain and conclusive. Good seed, when sown upon land in excellent tilth, will always produce a plentiful crop. The best of grain impregnated to the full with the most approved steep, and sown upon land indifferently prepared, will for ever disappoint the hopes of the farmer. I do not presume to condemn the practice in positive terms, because my experiments are against it. Other experiments may be opposed to

BOOK I. menstruums, and such vast conceptions; in the mean time that one may show them as heathy and hopeleſs grounds, and barren hills as any in England, that do now bear, or lately have borne, woods, groves, and copses, which yield the owners more wealth than the richest and most opulent wheat-lands: And if it be objected, that it is so long a day before

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mine. I shall therefore rest the whole upon a description of what happens to grain after it has been committed to the earth; and hope that I shall be able to explain myself with sufficient perspicuity. The subject is curious, and the discuſsion of it not very difficult.

A grain of wheat contains, within two capsules, a considerable share of flour, which, when melted down into a liquor by the watery juices of the earth, constitutes the nourishment of the tender plant, until its roots are grown sufficiently large to absorb their own food. Here is evidently a store-house of nutriment. And from that idea it is plain that the plumpest grains are the most eligible for seed. Some imagine that poor grains may be so impregnated, as to make them equal in vegetative force to the largest. I have more than once made the experiment, and am convinced that plump seeds, of the same heap, are superior in goodneſs to the small ones, though ever so careſully macerated. The farina being the food of the embryo plant, it follows that the vegetative powers will be increased in proportion to its quantity. I have sprouted all kinds of grain in a variety of steeps, and can aſsure the farmer, that the radicle and germ never appeared so vigorous and healthy, as when sprouted by elementary water: an argument that the seed requires no aſsistance. The same steep, when applied in quantity to the soil, will undoubtedly invigorate the roots, and nourish the plant; but in that case it operates in common with other manures, and loses the idea of a steep. As nitre, sea-salt, and lime, are generally added to the steeps, I have constantly observed that their application rendered the radicle and germ yellow and sickly: a plain proof that they were unnaturally used at that season. Did the farina need any additional particles, it might be supposed that broth made of the flesh of animals would be the most agreeable. To be satisfied of that, I sprouted some grains in beef broth, and an equal number in simple water. The result was, that the radicle and germ produced by the broth were weaker, and leſs healthy, than the others sprouted by the pure element. They were afterwards sown, but I could perceive no apparent difference in the crop. As no invigorating or fructifying liquor, however pompously introduced, has ever stood the test of fair and correct experiment, we may venture to lay it down as an established truth, that *plump seed clear of weeds, and land well prepared to receive it, will seldom disappoint the expectation of the farmer;* and upon these he should rely for the goodneſs of his crop. In this short diſsertation upon steeps, or fructifying liquors, it should be remarked, that I have drawn my conclusions from experiments made upon grain, instead of the seeds of forest-trees, in full confidence that the general laws of vegetation are the same in every kind of seed, from the almost *imperceptible* seed of the Orchis to the Acorn of the Sovereign Oak. And I had this additional reason, that, in the courſe of a few months, I could make my observations upon the different stages of vegetation, from the first appearance of the germ, to the final perfection of the plant.

these plantations can afford that gain, the Brabant nurseries, and divers home-plantations of industrious persons, are sufficient to convince the gainsayer. And when, by this husbandry, a few Acorns shall have supplied the neighbouring regions with young stocks and trees, the residue will become groves, and copses of infinite delight and satisfaction to the planters. Besides, we daily see what coarse lands will bear these stocks, (suppose them Oaks, Walnuts, Chesnuts, Pines, Fir, Ash, Wild Pears, Crabs, &c.) and some of them (as for instance, the Pear and the Fir, or Pine) strike their roots through the roughest and most impenetrable rocks and clefts of stone itself; and others require not any rich or pinguid, but very moderate soil; especially if committed to it in seeds, which allies them to their mother and nurse without renitency or regret: And then considering what assistances a little care in easing and stirring of the ground about them, for a few years, does afford them; what cannot a strong plough, a winter mellowing, and summer heats, incorporated with the pregnant turf, or a slight assistance of lime, loam, sand, rotten compost, discreetly mixed, (as the case may require,) perform even in the most unnatural and obstinate soil? And in such places where antiently woods have grown, but are now unkind to them, the fault is to be reformed by this care; and chiefly by a sedulous extirpation of the old remainders of roots, and latent stumps, which, by their mustiness, and other pernicious qualities, sour the ground, and poison the conception: And herewith let me put in this note, that even an over-rich and pinguid composition is by no means the proper bed either for the seminary or nursery, whilst even the natural soil itself does frequently discover and point best to the particular species, though some are for all places alike; nor should the earth be yet perpetually cropped with the same, or other seeds, without due repose, but lie some time fallow to receive the influence of heaven[1], according to good husbandry. But I shall say no

[1] The ingenious Dr. Priestley, in a paper presented to the Royal Society in 1772, on different kinds of air, among many interesting and important discoveries, proves to a demonstration that the putrid air arising from dunghills and the perspiration of animals, is not only absorbed by vegetables, but also adds to their increase. Though this power in vegetables was undoubtedly known long before the publication of the Doctor's philosophical works, yet, so far as I know, we had not any correct experiments, before his time, in proof of it. The world, therefore, is indebted to Dr. Priestley alone, for the experi-

BOOK I.

more of these particulars at this time, because the rest are sprinkled over this whole work in their due places; wherefore we hasten to the following title, namely, the choice and ordering of the seeds.

3. Choose your seed of that which is perfectly mature, ponderous, and sound; commonly that which is easily shaken from the boughs, or gathered about November, immediately upon its spontaneous fall, or taken from the tops and summities of the fairest and soundest trees, is best, and does, for the most part, direct to the proper season of interring, &c. according to institution.

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mental proofs of a circumstance so full of harmony. In January 1769, being engaged in an investigation of the nature of the Food of vegetables, with a view to establish a theory of Agriculture, I saw that there must be some secret property in the air, which restored worn-out lands to their former fertility; and as I could not persuade myself that it arose from the universal acid, so much talked of, I was led, by a chain of reasoning and some few experiments, to conclude that it must proceed from putrid exhalations, first generated upon the surface of the earth, then raised into the atmosphere, and afterwards brought down by rain: In this manner I supposed that the INFLUENCE of HEAVEN, as Mr. Evelyn well expresses it, was obtained. Having fully satisfied myself that worn-out lands were thus restored, I went a step further, and concluded, as I thought, with certainty, that all plants, by their leaves as well as by their roots, imbibed these putrid vapours for their food. And here I beg leave to remark, that I do not mean to say that plants have no other nutriment, as it may be proved to a demonstration that many things give them food without having undergone the putrid ferment. March 8, 1769, (two years before Dr. Priestley began any experiments in vegetation) I read a memoir upon this curious subject before the York Agriculture Society, being the day of their institution; and in June following I published it in a small duodecimo volume of 66 pages, under the title of GEORGICAL ESSAYS. The favourable reception that this work met with, induced me to republish it in 1770, with considerable additions. The words I refer to are these: "During the summer months the "atmosphere is full of putrid exhalations arising from the steam of dunghills, the perspi- "ration of animals and smoak. Every shower brings down these oleaginous * particles "for the nourishment of plants." *Georg. Essays, p.* 10. "It is pleasing to observe how the "disolution of one body is necessary for the life and increase of another. All nature is "in motion. In consequence of the putrid fermentation that is every where carried on, "a quantity of vegetable nutriment ascends into the atmosphere. Summer showers "return much of it again; but part falls into the sea and is lost: To this we may add the "animal and vegetable substances consumed on board of ships, all of which are buried in "the ocean. The industry of man restores them to the earth; and we may presume that "the fish taken from the sea leave a balance in favour of mankind; Thus Provi-

* The word *Oleaginous* is chiefly applied to smoak, and corresponds with the theory of the food of plants, as described in the essays here quoted.

At specimen sationis, et insitionis origo
Ipsa fuit rerum primum Natura creatrix:
Arboribus quoniam baccæ, glandesque caducæ
Tempestiva dabant pullorum examina subter. LUCRET. l. v.

Nature herself, who all created first,
Invented sowing, and the wild plants nurst:
When mast and berries from the trees did drop,
Succeeded under by a numerous crop.

Yet this is to be considered, that if the place you sow in be too cold for an autumnal semination, your acorns, mast, and other seeds may be

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"dence, with the most consummate wisdom, keeps up the neceſsary rotation of "things." *Georg. Eſsays, p.* 332.

So far I had considered this putrid nutriment as absorbed by the *roots* of plants; but the ingenious experiments of Dr. Priestley refer to the absorption of the putrid air by the *leaves* of plants. *That* I had also remarked in a variety of places. "Hitherto I have "considered plants as nourished by their roots; I shall now take a view of them as "nourished by their leaves. An attention to this part of the vegetable system is "eſsentially neceſsary to the rational farmer. Vegetables that have a succulent leaf, such "as vetches, pease, beans, and buck-wheat, draw a great part of their nourishment from "the air, and on that account impoverish the soil leſs than wheat, oats, barley, or rye, "the leaves of which are of a firmer texture. Rape and hemp are oil-bearing plants, and "consequently impoverishers of the soil; but the former leſs so than the latter, owing to "the greater succulency of its leaf. The leaves of all kinds of grain are succulent for a "time, during which period the plants take little from the earth; but as soon as the ear "begins to be formed, they lose their softneſs and diminish in their attractive power. The "radical fibres are then more vigorously employed in extracting the oily particles of "the earth for the nourishment of the seed. Such, I apprehend, is the course of "nature." *Ibid. p.* 25.

"The air contains, especially during the summer months, all the principles of vegetation; "oil *(phlogiston)* for the perfect food, water to dilute it, and salts to aſsimilate it. These "are greedily absorbed by the veſsels of the leaves and bark, and conveyed to the inner-"most parts of the plant for its growth and fructification." *Ibid. p.* 64.

"In order that we may have a distinct view of the motion of the sap, it will be neces-"sary to reflect, that the root, stem, branches, and leaves are constructed in the same "manner. Sallows, willows, vines, and most shrubs, will grow in an inverted state, with "their tops downward in the earth. Dr. Bradley describes the manner of inverting a "young cherry-tree, the roots of which will put forth leaves, and the branches become "roots. Hence it is obvious that the nutritive matter may be conveyed as well by the "leaves as the roots, their vascular structure being the very same." *Ibid. p.* 79.

BOOK I. prepared for the vernal, by being barrelled or potted up in moist sand, or earth, stratum super stratum, during the winter; at the expiration whereof you will find them sprouted; and being committed to the earth, with a tender hand, as apt to take as if they had been sown with the most early, nay, with great advantage: By this means too, they have escaped the vermin, which are prodigious devourers of winter sowing,

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"During the heat of a summer's day, all plants perspire freely from the pores of their "leaves and bark. At that time the juices are highly rarified. The diameters of the "Tracheæ, or air-veſsels, are enlarged, ſo as to preſs upon and straiten the veſsels that "carry the sap. In consequence of which their juices, not being able to escape by the "roots, are preſsed upward, where there is the least resistance, and perspire off the "excrementitious parts by the leaves and top-branches, in the form of vapour. When "the solar heat declines, the tracheæ are contracted. The sap-veſsels are enlarged, and "the sap sinks down in the manner of the spirits of a thermometer. In consequence of "this change, the capillary veſsels of the leaves and top-branches become empty: Being "surrounded with the humid vapours of the evening, they fill themselves from the known "laws of attraction, and send down the new acquired juices to be mixed with those that "are more elaborated. As soon as the sun has altered the temperature of the air, the "tracheæ become again distended, and the sap-veſsels are straitened. The same cause "always produces the same effect; and this alternate ascent and descent, through the "same system of veſsels, continues as long as the plant survives." *Georg. Eſsays*, *p.* 79.

"Air is to be found in every portion of earth; as it always contains a solution of "the volatile parts of animal and vegetable substances, we should be careful to keep our "stiff soils as open as poſsible to its influence. It paſses, both in its active and fixed state, "into the absorbent veſsels of the root, and, mixing with the juices of the plant, circulates "through every part. Dr. Hales, in his statical experiments upon the vine, discovered "it ascending with the sap in the bleeding season." *Ibid. p.* 85.

These extracts, published in 1769 and 1770, will abundantly show that at those early periods I was acquainted with the œconomy of nature in the consumption of the putrid and noxious particles of the atmosphere, by the vegetable creation. It did not belong to my argument to say, that in consequence of this removal of *phlogiston*, the air became "pure and fit for animal respiration." That harmonious reflection arose from the subject, and naturally invited experimental inquiry. And happy it is for the philosophical world, that the prosecution of this inquiry has fallen to the lot of Dr. Priestley, whose experiments are so ingeniously conducted, and whose conclusions are so fairly drawn, that I cannot avoid extracting from them so much as regards the present argument: "When "air has been freshly and strongly tainted with putrefaction, so as to smell through the "water, sprigs of mint have presently died, upon being put into it, their leaves turning "black; but if they do not die presently, they thrive in a most surprising manner. In no "other circumstances have I ever seen vegetation so vigorous as in this kind of air, which "is immediately fatal to animal life. Though these plants have been crowded in jars

and will not be much concerned with the increasing heat of the season, as such as being crude, and unfermented, are newly sown in the beginning of the spring, especially in hot and loose grounds; being already in so fair a progrefs by this artificial preparation, and which (if the provision to be made by very great) may be thus managed: Choose a fit piece of ground, and with boards (if it have not that position of itself) design it

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"filled with this air, every leaf has been full of life; fresh shoots have branched out in "various directions, and have grown much faster than other similar plants, growing in the "same exposure in common air. This observation led me to conclude, that plants, "instead of affecting the air in the same manner with animal respiration, reverse the "effects of breathing, and tend to keep the atmosphere sweet and wholesome, when "it is become noxious, in consequence of animals either living and breathing, or "dying and putrefying in it.——In order to ascertain this, I took a quantity of air, "made thoroughly noxious, by mice breathing and dying in it, and divided it into two "parts; one of which I put into a phial immersed in water; and to the other (which "was contained in a glafs jar, standing in water) I put a sprig of mint. This was "about the beginning of August 1771, and after eight or nine days, I found that a mouse "lived perfectly well in that part of the air, in which the sprig of mint had grown, but "died the moment it was put into the other part of the same original quantity of air; "and which I had kept in the very same exposure, but without any plant growing in it. "This experiment I have several times repeated; sometimes using air in which animals "had breathed and died; sometimes using air tainted with vegetable or animal putre-"faction, and generally with the same succefs. Once I let a mouse live and die in a "quantity of air which had been noxious, but which had been restored by this procefs, "and it lived nearly as long as I conjectured it might have done in an equal quantity of "fresh air; but this is so exceedingly various, that it is not easy to form any judgment "from it; and in this case the symptom of *difficult respiration* seemed to begin earlier than "it would have done in common air. Since the plants that I made use of manifestly "grow and thrive in putrid air; since putrid matter is well known to afford proper "nourishment for the roots of plants; and since it is likewise certain that they receive "nourishment by their leaves as well as by their roots, it seems to be exceedingly probable, "that the putrid effluvium is in some measure extracted from the air, by means of the "leaves of plants; and therefore that they render the remainder more fit for respiration. "Towards the end of the year some experiments of this kind did not answer so well as "they had done before, and I had instances of the relapsing of this restored air to its "former noxious state: I therefore suspended my judgment concerning the efficacy of "plants to restore this kind of noxious air, till I should have an opportunity of repeating "my experiments, and giving more attention to them. Accordingly I resumed the "experiments in the summer of the year 1772, when I presently had the most "indisputable proof of the restoration of putrid air by vegetation; and as the fact is of "some importance, and the subsequent variation in the state of this kind of air is a little "remarkable, I think it necefsary to relate some of the facts pretty circumstantially.

BOOK I. three feet high; lay the first foot in fine earth, another of Seeds, Acorns, Mast, Keys, Nuts, Haws, Holly-berries, &c. promiscuously or separate, with, now and then, a little mould sprinkled amongst them; the third foot wholly earth: Of these preparatory magazines make as many and as much larger ones as will serve your turn, continuing it from time to time as your store is brought in. The same you may also do for ruder hand-

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"The air, on which I made the first experiments, was rendered exceedingly noxious by "mice dying in it on the 20th of June. Into a jar nearly filled with one part of this air, "I put a sprig of mint, while I kept another part of it in a phial, in the same exposure; "and on the 27th of the same month (and not before) I made a trial of them, by intro- "ducing a mouse into a glaſs veſsel, containing $2\frac{1}{2}$ ounce measures filled with each kind "of air; and I noted the following facts. When the veſsel was filled with the air in "which the mint had grown, a very large mouse lived five minutes in it, before it began to "show any sign of uneasineſs. I then took it out, and found it to be as strong and "vigorous as when it was first put in; whereas in that air which had been kept in the "phial only, without a plant growing in it, a younger mouse continued not longer than "two or three seconds, and was taken out quite dead. It never breathed after, and was "immediately motionleſs. After half an hour, in which time the larger mouse (which I "had kept alive, that the experiment might be made on both the kinds of air with the "very same animal) would have been sufficiently recruited, supposing it to have received "any injury by the former experiment, was put into the same veſsel of air; but though it "was withdrawn again, after being in it hardly one second, it was recovered with "difficulty, not being able to stir from the place for near a minute. After two days, I "put the same mouse into an equal quantity of common air, and observed that it continued "seven minutes without any sign of uneasineſs; and being very uneasy after three "minutes longer, I took it out. Upon the whole, I concluded that the restored air wanted "about one fourth of being as wholesome as common air. The same thing also appeared "when I applied the test of nitrous air. In the seven days, in which the mint was "growing in this jar of noxious air, three old shoots had extended themselves about three "inches, and several new ones had made their appearance in the same time. Dr. Franklin "and Sir John Pringle happened to be with me, when the plant had been three or four "days in this state, and took notice of its vigorous vegetation, and remarkably healthy "appearance in that confinement. On the 30th of the same month, a mouse lived "fourteen minutes, breathing naturally all the time, and without appearing to be much "uneasy, till the last two minutes, in the veſsel containing two ounce measures and a "half of air which had been rendered noxious by mice breathing in it almost a year "before, and which I had found to be most highly noxious on the 19th of this month, a "plant having grown in it, but not exceedingly well, these eleven days; on which "account I had deferred making the trial so long. The restored air was effected by a "mixture of nitrous air, almost as much as common air. As this putrid air was thus easily "restored to a considerable degree of fitneſs for respiration, by plants growing in it, I

lings by burying your seeds in dry sand, or pulverised earth, barrelling them, as I said, in tubs, or laid in heaps in some deep cellar, where the rigour of the winter may least prejudice them; and I have filled old hampers, bee-hives, and boxes with them, and found the like advantage; which is to have them ready for your Seminary, as before hath been showed, and exceedingly prevent the season. There be also who affirm, CHAP. I.

"was in hopes that by the same means it might in time be so much more perfectly "restored, that a candle would burn in it; and for this purpose I kept plants growing in "the jars which contained this air till the middle of August following, but did not take "sufficient care to pull out all the old and rotten leaves. The plants, however, had grown, "and looked so well upon the whole, that I had no doubt but that the air must constantly "have been in a mending state; when I was exceedingly surprised to find, on the 24th of "that month, that though the air in one of the jars had not grown worse, it was no better, "and that the air in the other jar was so much worse than it had been, that a mouse would "have died in it in a few seconds. It also made no effervescence with nitrous air, as it "had done before. Suspecting that the same plant might be capable of restoring putrid "air to a certain degree only, or that plants might have a contrary tendency in some "stages of their growth, I withdrew the old plant, and put a fresh one its place; and "found that, after seven days, the air was restored to its former wholesome state. This "fact I consider as a very remarkable one, and well deserving of a farther investigation, "as it may throw more light upon the principles of vegetation. It is not, however, a "single fact; for I had several instances of the same kind in the preceding year; but it "seemed so very extraordinary, that air should grow worse by the continuance of the "same treatment by which it had grown better, that, whenever I observed it, I concluded "that I had not taken sufficient care to satisfy myself of its previous restoration. That "plants are capable of perfectly restoring air injured by respiration, may, I think, be "inferred with certainty from the perfect restoration, by this means, of air which had "passed through my lungs, so that a candle would burn in it again, though it had "extinguished flame before, and a part of the same original quantity of air still con- "tinued to do so. Of this one instance occurred in the year 1771, a sprig of mint having "grown in a jar of this kind of air, from the 25th of July to the 17th of August following; "and another trial I made, with the same success, the 7th of July, 1772, the plant having "grown in it from the 29th of June preceding. In this case also I found that the effect "was not owing to any virtue in the leaves of mint; for I kept them constantly changed "in a quantity of this kind of air, for a considerable time, without making any sensible "alteration in it. These proofs of a partial restoration of air by plants in a state of "vegetation, though in a confined and unnatural situation, cannot but render it highly "probable, that the injury which is continually done to the atmosphere by the respiration "of such a number of animals, and the putrefaction of such masses of both vegetable and "animal matter, is, in part at least, repaired by the vegetable creation. And, notwith- "standing the prodigious mass of air that is corrupted daily by the above-mentioned "causes; yet, if we consider the immense profusion of vegetables upon the face of the "earth, growing in places suited to their nature, and consequently at full liberty to exert

BOOK I. that the careful cracking and opening of stones, which include the kernels, as soon as ripe, precipitate growth, and gain a year's advance; but this is erroneous. Now, if you gather them in moist weather, lay them a drying, and so keep them till you sow, which may be as soon as you please after Christmas. If they spire out before you sow them, be sure to commit them to the earth before the sprout grows dry, or else expect little from them: And whenever you sow, if you prevent not the little field-mouse, he will be sure to have the better share [k].

" all their powers, both inhaling and exhaling, it can hardly be thought, but that it may " be a sufficient counterbalance to it, and that the remedy is adequate to the evil.— " Dr. Franklin, who, as I have already observed, saw some of my plants in a very flourishing " state, in highly noxious air, was pleased to expreſs very great satisfaction with the " result of the experiments. In his answer to the letter in which I informed him of it, " he says, " *That the vegetable creation should restore the air which is ſpoiled by the animal part of it, looks like a rational ſyſtem, and ſeems to be of a piece with the reſt. Thus fire purifies water all the world over. It purifies it by diſtillation, when it raiſes it in vapours, and lets it fall in rain; and farther ſtill by filtration, when, keeping fluid, it ſuffers that rain to percolate the earth. We knew before that putrid animal ſubſtances were converted into ſweet vegetables, when mixed with the earth, and applied as manure; and now, it ſeems, that the ſame putrid ſubſtances, mixed with the air, have a ſimilar effect. The ſtrong thriving ſtate of your mint in putrid air, ſeems to ſhow that the air is mended by taking ſomething from it, and not by adding to it.*"———Experiments and Observations on different Kinds of Air, p. 86—94. Vol. I.

Every one who has a pleasure in contemplating and reflecting upon the wisdom of God in the creation, must be delighted with the harmony of the above system; but some foreign philosophers have lately introduced a new theory in hopes of destroying it entirely. They tell us that vegetables, during the day time, are continually perspiring through their leaves oxigene, or good air, and that in the night time, the same system of veſsels pour forth azote, or impure air. If this kind of reasoning be founded upon correct experiment, we should form our plantations at some distance from our habitations, in order that these two opposite kinds of air may be well mixed with the surrounding atmospheric air before they find their way into the family-apartments. We should also forbid the introduction of plants into our parlours and drawing-rooms, in order to guard against those diseases that are supposed to originate in an exceſs, or deficiency, either of azote or oxigene. To enter further into the medical history of those airs would in this place be thought improper.

[k] It must be confeſsed that sowing of Acorns, Beech-Mast, Ash-Keys, &c. in the Autumn, when those seeds fall spontaneously from the trees, appears by much the most *natural* method; but the destruction made by the field-mouse upon those seeds, both at the time of sowing and during the winter, has induced many gentlemen to preſer Spring-sowing to the Autumnal one. When the first is determined on, the acorns and other seeds must be careſully preserved during the winter; and, in forming the magazines, care must be taken to keep the different sorts apart from each other. It is not customary to preserve the acorns, &c. in the manner recommended by Mr. Evelyn; but, as he always speaks from experience, his method should not be rashly condemned.

4. But to pursue this to some farther advantage, as to what concerns the election of your seed, it is to be considered, that there is a vast difference in trees even of the same growth and bed, which I judge to proceed from the variety and quality of the seed: This, for instance, is evidently seen in the heart, procerity, and stature of timber; and therefore choose not your seeds always from the most fruitful trees, which are commonly the most aged and decayed; but from such as are found most solid and fair. Nor, for this reason, covet the largest acorn, &c. but (as husbandmen do their wheat) the most weighty, clean, and bright. This observation we deduce from fruit-trees, which we seldom find to bear so kindly and plentifully from a sound stock, smooth rind, and firm wood, as from a rough, lax, and untoward tree; which is rather prone to spend itself in fruit (the ultimate effort, and final endeavour of its most delicate sap) than in solid and close substance to increase the timber. And this shall suffice, though some haply might here recommend to us a more accurate microscopical examen, to interpret their most secret schematisms, which were an over nicety for these great plantations.

5. As concerning the medicating and insuccation of seeds, or enforcing the earth by rich and generous composts, &c. for trees of these kinds, I am no great favourer of it; not only because the charge would much discourage the work, but for that we find it unnecessary, and, for most of our forest-trees, noxious; since even where the ground is too fertile, they thrive not so well; and if a mould be not proper for one sort, it may be fit for another. Yet I would not, by this, hinder any from the trial, what advance such experiments will produce: In the mean time, for the simple imbibition of some seeds and kernels, when they prove extraordinary dry, as the season may fall out, it might not be amiss to macerate them in milk or water only, a little impregnated with cow-dung, &c. during the space of twenty-four hours, to give them a spirit to sprout and chet the sooner; especially if you have been retarded in your sowing without the former preparation: But concerning the mould, soiling, and preparations of the ground, I refer you to my "Treatise of Earth," if what you meet with in this do not abundantly encounter all those difficulties.

6. Being thus provided with seeds of all kinds, I would advise to raise woods by sowing them apart in several places destined for their growth, where the mould being prepared (as I shall show hereafter) and so quali-

BOOK I. fied, if election be made, as best to suit with the nature of the species, they may be sown promiscuously, which is the most natural and rural; or in straight and even lines, for hedge-rows, avenues, and walks, which is the more ornamental.

AIR. As to the Air and Water, they are certainly of almost as great importance to the life and prosperity of trees and vegetables; and therefore it is to be wished for and sought, (and they commonly follow, or indicate the nature of the soil, or the soil of them,) that they be neither too keen or sharp, too cold or hot, not infected with fogs and poisonous vapours, or exposed to sulphurous exhalations, or frigiverous winds, reverberating from hills and other ill-situate eminences, prefsing down the incumbent particles so tainted or conveyed through the inclosed vallies; but such as may gently enter and pervade the cenabs and vefsels, destined and appointed for their reception, intromifsion, respiration, and pafsage, in almost continual motion: In a word, such as is most agreeable to the life of man, duly qualified with their proper mixts, be it nitre, or any other vegetable matter, though we neither see, nor distinctly taste it; nay, so universally pervading and neceſsary, that all aquatics, how deeply soever submerged, could not subsist without this active element the air.

WATER. The same qualification is, as we said, required in Water, to which it is of so near alliance, and whose office it is not only to humectate, mollify, and prepare both the seeds and roots of vegetables, to receive the nutrition, pabulum, and food, of which this of water as well as air are the proper vehicles, insinuating what they carry into the numerous pores, and through the tubes, canals, and other emulgent pafsages and percolations to the several vefsels, where (as in a stomach) it is elaborated, concocted, and digested, for distribution through every part of the plant; and therefore had need be such as should feed, not starve, infect, or corrupt; which depends upon the nature and quality of the mixed, with what other virtue, spirit, mineral, or other particles, accompanying the purest springs (to appearance) pafsing through the closest strainers. This therefore requires due examination, and sometimes exposure to the air and sun, and accordingly the crudity and other defects taken off and qualified: From all which rain-water that has had its natural circulation, is greatly free, so it meets with no noxious vapours in the defcent, as it must do pafsing through clouds of smoak and soot, over and about great cities, and other volcanoes, continually vomiting out their acrimonious, and sometimes pestiferous fervour, infecting the ambient air, as it

perpetually does about London and for many miles adjacent, as I have shown in my treatise entitled *Fumifugium*.

In the mean time whether water alone is the cause of the solid and bulky part, and consequeutly of the augmentation of trees and plants, or without any thing more to do with that element than as it serves to transport some other matter, is very ingeniously discufsed, and curiously inquired into by Dr. Woodward, in his *History of the Earth*, fortified with divers nice experiments too large to be here inserted[1]. The sum is, that

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[1] It is of the utmost consequence to determine what is the Food of Plants. Upon that question Philosophers have widely differed. From a number of experiments, accurately conducted, I am led to believe that all vegetables, from the hyfsop upon the wall, to the cedar of Lebanon, receive their principal nourishment from oily particles incorporated with water, by means of an alkaline salt or absorbent earth. Until oil is made miscible, it is unable to enter the radical vefsels of vegetables; and, on that account, Providence has bountifully supplied all natural soils with chalky or other absorbent particles. I say natural soils; for those which have been afsisted by art are full of materials for that purpose; such as lime, marl, soap-ashes, and the volatile alkaline salt of putrid dunghills. It may be asked, whence do natural soils receive their oily particles? I answer, the air supplies them. During the summer months, the atmosphere is full of exhalations arising from the steam of dunghills, the perspiration of animals, and smoke. Every shower brings down these putrescent and oleaginous particles for the nourishment of plants. Of these particles, some fall into the sea, where they probably serve for the nourishment of fuci, and other submarine plants. They are, however, but seemingly lost, as the fish taken from the sea, and the weeds thrown upon the beach, restore them again under a different form. Thus Providence, with the most consummate wisdom, keeps up the neceefsary rotation of things.

> Haud igitur penitus pereunt quæcumque videntur:
> Quando aliud ex alio reficit Natura: nec ullam
> Rem gigni patitur, nisi morte adjutam aliena. LUCRET.

The ingenious Mr. Tull, and others, contend that earth is the food of plants. If so, all soils equally tilled would prove equally prolific. The increased fertility of a well-pulverised soil, induced him to imagine that the plough could so minutely divide the particles of earth, as to fit them for entering into the roots of plants. An open soil, if not too light in its own nature, will always produce plentiful crops. It readily receives the air, rains, and dews into its bosom, and at the same time gives the roots of plants a free paſsage in quest of food. This is the true reason why land well tilled is so remarkably fruitful.—Water is thought, by some, to be the food of vegetables, when in reality it is only the vehicle of nourishment. Water is an heterogeneous fluid, and is no where to be found pure. It always contains a solution of animal or vegetable substances. These constitute the nourishment of plants, and the element in which they are minutely suspended, acts only as a vehicle, in guiding them through the fine vefsels of the vegetable body. The

BOOK I.

water, be it of rain or the river, (superior or inferior,) carries with it a certain superfine terrestrial matter, not destitute of vegetative particles, which gives body, substance, and all other requisites to the growth and perfection of the plant, with the aid of that due heat which gives life and motion to the vehicle's paſsage through all the parts of the vegetable, continually ascending, till (having sufficiently saturated them) it trans-

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hyacinth, and other bulbous roots, are known to perfect their flowers in pure water.—Hence superficial observers have drawn an argument in favour of water being the food of vegetables. But the truth is, the roots, stem, and flowers of such plants are nourished by the mucilaginous juices of the bulb, diluted by the surrounding water. This mucilage is just sufficient to perfect the flower—and no more. Such a bulb neither forms seeds, nor sends forth off-sets. At the end of the season, it appears weak, shrivelled, and exhausted, and is rendered unfit to produce flowers the succeeding year. A root of the same kind, that has been fed by the oily and mucilaginous juices of the earth, eſsentially differs in every particular: it has a plump appearance, is full of mucilage—with off-sets upon its sides. All rich soils, in a state of nature, contain oil; and in those lands which have been under the plough for some years, it is found in proportion to the quantity of putrid dung that has been laid upon them, making an allowance for the crops they have sustained. To set this matter in a clearer light, let us attend to the effects of manures of an oily nature, and we shall soon be satisfied that oil, however modified, is one of the chief things concerned in vegetation. Rape-dust, when laid upon land, is a speedy and certain manure, though an expensive one, and will generally answer best on a limestone land, or where the soil has been moderately limed. This species of manure is much esteemed by the farmer. It contains the food of plants ready prepared; but as it is not capable of loosening the soil by any fermentation, the lands upon which it is laid ought to be in excellent tilth. At present, that useful article of huſbandry is much diminished in goodneſs, owing to the improved methods of extracting the oil from the rape. Heat and preſsure are employed in a double degree. Farmers that live in the neighbourhood of large towns use abundance of soot. It is an oily manure, but different from the former, containing alkaline salt in its own nature, calculated as well for opening the soil, as for rendering the oily parts miscible with water. It is observed that pigeon's dung is a rich and hasty manure. These animals feed chiefly upon grains and oily seeds; it must therefore be expected that their dung should contain a large proportion of oil. The dung of stable-kept horses is also a strong manure, and should not be used until it has undergone the *putrid ferment*, in order to mix and aſsimilate its oily, watery, and saline parts. Beans, oats, and hay, contain much oil. The dung of horses that are kept upon green herbage, is of a weaker kind, containing much leſs oil. Swine's dung is of a saponaceous and oily nature, and perhaps is the richest of the animal manures. When made into a compost and applied with judgment, it is excellent both for arable and graſs lands. The dung of stall-fed oxen, especially if oil-cake make part of their food, is of a rich quality and greatly preferable to that of cows and oxen supported by graſs only. A farmer, when he purchases dung should attend to all the circumstances under which it is produced. One load of dung from a hunting stable where much corn is consumed, is worth two loads produced by hay and

pires the rest of the liquid at the summity and tops of the branches into the atmosphere, and leaving some of the leſs-refined matter in a viscid honey-dew, or other exsudations, (often perceived on the leaves and bloſsoms,) anon descending and joining again with what they meet, repeat this course in perpetual circulation. Add to this, that from hence those regions and places, crowded with numerous and thick-standing forest-

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green provender. The dung of ruminant animals, as cows and sheep, is preferable to that of horses at graſs, owing to the quantity of animal juices mixed with their food in chewing. And here I beg leave to remark in general, that the latter the animal, *cæteris paribus*, the richer the dung. Human ordure is full of oil and a volatile alkaline salt. By itself, it is too strong a manure for any land; it should therefore be made into a compost before it is used. The dung of carniverous animals is plentifully stored with oil. Animals that feed upon seeds and grains come next, and after them follow those which subsist upon graſs only. To suit these different manures to their proper soils, requires the greatest judgment of the farmer, as what may be proper for one soil, may be highly detrimental to another.

In order to strengthen my argument in favour of oil being the principal food of plants, I must beg leave to observe, that all vegetables, whose seeds are of an oily nature, are found to be remarkable impoverishers of the soil, as hemp, rape, and flax; for which reason, the best manures for lands worn out by these crops, are such as have a good deal of oil in their composition; but then they must be laid on with lime, chalk, marl, or soap-ashes, so as to render the oily particles miscible with water. The book of nature may be displayed, to show that oily particles constitute the nourishment of plants in their embryo state; and, by a fair inference, we may suppose that something of the same nature is continued to them as they advance in growth. The oily seeds, as rape, hemp, line, and turnip, consist of two lobes, which, when spread upon the surface, form the seminal leaves. In them the whole oil of the seed is contained. The moisture of the atmosphere penetrates the cuticle of the leaves, and, mixing with the oil, constitutes a kind of milk for the nourishment of the plant. The sweetneſs of this balmy fluid invites the fly, against which no sufficient remedy has, as yet, been discovered. The oleaginous liquor being consumed, the seminal leaves decay, having performed the office of a mother to her tender infant. To persons unacquainted with the analogy between plants and animals, this reflection will appear strange. Nothing, however, is more demonstrable. Most of the leguminous and farinaceous plants keep their placenta, or seminal leaves, within the earth; in which situation they supply the tender germ with oily nutriment, until its roots are grown sufficiently strong to penetrate the soil.

It is usual to talk of the salts of the earth; but chymistry has not been able to discover any salts in land which has not been manured, though, it is said, that oil may be obtained from every soil, the very sandy ones excepted. Marl, though a rich manure, has no salts. It is thought to contain a small portion of oleaginous matter, and an absorbent earth, of a nature similar to limestone, with a large quantity of clay intermixed. Lime mixed with clay comes nearest to the nature of marl of any factitious body that we know of, and may

BOOK I.

trees and woods, (which hinder the neceſsary evolition of this superfluous moisture and intercourse of the air,) render those countries and places more subject to rain and mists, and consequently unwholesome, as is found in our American plantations, as formerly nearer us in Ireland; both since so much improved by felling and clearing these spacious shades, and letting in the air and sun, and making the earth fit for tillage and

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be used as such, where it can be had without much expence. By increasing the quantity of clay, it will make an excellent compost for a light sandy soil; but to make the ground fertile, woollen rags, rotten dung, or any oily manure, should be incorporated with it some time before it is laid on. It is the opinion of some, that lime enriches the land it is laid upon, by means of supplying a salt fit for the nourishment of plants; but by all the experiments that have been made upon lime, it is found to contain no kind of salt. Its operation therefore should be considered in a different light; by the fermentation that it induces the earth is opened and divided, and, by its absorbent and alkaline quality, it unites the oily and watery parts of the soil. It also seems to have the property of collecting something from the air, but with which we are not yet sufficiently acquainted. From viewing lime in the light of aſsimilating oil and water, it is probable that it tends to rob the soil of its oily particles, and in time will render it barren, unleſs we take care to support it with rotten dung, or other manures of an oily nature. As light sandy soils contain but a small portion of oleaginous particles, we should be extremely cautious not to overdo them with lime, unleſs we can at the same time aſsist them liberally with rotten dung, woollen rags, shavings of horn, and other manures of an animal kind. Its great excellence, however, upon a sandy soil, is by mechanically binding the loose particles, and thereby preventing the liquid parts of the manure from escaping out of the reach of the radical fibres of the plants. Upon clay the effect of lime is different; for by means of the gentle fermentation that it produces, the unsubdued soil is opened and divided: the manures laid on readily come into contact with every part of it; and the fibres of the plants have full liberty to spread themselves. It is generally said that lime answers better upon sand than clay.—This observation will undoubtedly hold good as long as the farmer continues to lime his clay lands in a scanty manner. Let him double the quantity, and he will then be convinced that lime is better for clay than sand. It may be justly answered, that the profits will not admit of the expence. I agree. But then it must be understood that it is the application, and not the nature of the lime, that should be called in question. Clay, well limed, will, after a time, fall in water, and ferment with acids. Its very nature is changed. Under such agreeable circumstances, the air, rains, and dews are freely admitted, and the soil is enabled to retain the nourishment that each of them brings. In consequence of a fermentation raised in the soil, the fixed air is set at liberty, and in that state of activity it becomes an useful instrument in dividing the tenaceous clay. However, let the farmer who uses much lime for his clay lands, be instructed to manure them well, otherwise the soil will become too hard to permit the roots of the plants to spread themselves in search of food. It is the nature of lime to attract oils, and diſsolve vegetable bodies. Upon these principles we may account for the wonderful effects of lime in the improvement of black

pasture, that those gloomy tracts are now become healthy and habitable. It is not to be imagined how many noble seats and dwellings in this nation of ours (to all appearance well situated) are for all that unhealthful, by reason of some grove or hedge-rows of antiquated dotard trees (nay, sometimes a single tuft only, especially the falling autumnal leaves neglected to be taken away) filling the air with musty and noxious exhala- CHAP. C

moor-land. Moor-earth consists of difsolved, and half-difsolved vegetable substances. It is full of oil. Lime difsolves the one and afsimilates the other. Such lands, not originally worth fourpence per acre, may be made by paring, burning, and liming, to produce plentiful crops of turnips, which may be followed by oats, rye, barley, or grafs-seeds, according to the inclination of the owner. These observations, however, are rather foreign to the present argument, to which I shall now return.

To the universal principle, oil, we must add another of great efficacy, though very little understood; I mean the nitrous acid of the air. That the air does contain the rudiments of nitre, is demonstrable from the manner of making salt-petre in the different parts of the world. The air contains no such salt as perfect nitre; it is a factitious salt, and is made by the nitrous acid falling upon a proper matrix. The makers of nitre form that matrix of the rubbish of old houses, fat putrescent earth, and any fixed alkaline salt. The universal acid, as it is called, is attracted by these materials, and forms true nitre, which is rendered pure by means of crystallization, and in that form it is brought to us. In very hot countries the natural earth forms a matrix for nitre, which makes the operation very short. It is observed that nitre is most plentifully formed in winter, when the wind is northerly: hence we may understand the true reason why farmers and nurserymen lay up their lands in high ridges during the winter months. The good effects of that operation are in general attributed to the mechanical action of the frost upon the ground. Light soils, as well as tough ones, may be exposed in high ridges, but with some limitation, in order to imitate the mud walls in Germany, which are found, by experience, to collect considerable quantities of nitre during the winter. After saying so much in praise of nitre, it will be expected that I should produce some proofs of its efficacy, when used as manure. I must confefs that experiments do not give us any such proofs. Perhaps too large a quantity has been used; or rather, it could not be restored to the earth with its particles so minutely divided, as when it remained united with the soil, by means of the chymistry of Nature. I shall therefore consider this nitrous acid, or, as philosophers call it, the *acidum vagum*, in the light of a vivifying principle, with whose operation we are not yet fully acquainted—A curious observer will remark, that there subsists a strong analogy between plants and animals. Oil and water seem to make up the nourishment of both. Earth enters very little into the composition of either. It is known that animals take in a great many earthy particles at the mouth, but they are soon discharged by urine and stool. Vegetables take in the smallest portion imaginable of earth; and the reason is, they have no way to discharge it. It is highly probable, that the radical fibres of plants take up their nourishment from the earth in the same manner that the lacteal vefsels absorb the nutriment from the intestines; and as the oily and watery parts of our food are perfectly united into a milky

BOOK. I. tions, which being ventilated by glades cut through them, for paſsage of the stagnant vapours, have been cured of this evil, and recovered their reputation.

But to return to where we left: Water in this action, imbibed with such matter, applicable to every species of plants and vegetables, does

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liquor, by means of the spittle, pancreatic juice, and bile, before they enter the lacteals, we have all the reason imaginable to keep up the analogy, and suppose that the oleaginous and watery parts of the soil are also incorporated, previous to their being taken up by the absorbing veſsels of the plant. To form a perfect judgment of this, we must reflect that every soil, in a state of nature, has in itself a quantity of absorbent earth, sufficient to incorporate its inherent oil and water; but when we load it with fat manures, it becomes eſsentially neceſsary to bestow upon it, at the same time, something to aſsimilate the parts. Lime, soap-ashes, kelp, marl, and all the alkaline substances, perform that office. In order to render this operation visible to the senses: diſsolve one drachm of Ruſsia pot-ash in two ounces of water; then add two spoonfuls of oil. Shake the mixture, and it will instantly become an uniform maſs of a whitish colour, adapted, as I conceive, to all the purposes of vegetation. This easy and familiar experiment is a just representation of what happens after the operation of Burn-baking, and consequently may be considered as a confirmation of the hypothesis advanced. Let us attend to the proceſs. The sward being reduced to ashes, a fixed alkaline salt is produced. The moisture of the atmosphere soon reduces that salt into a fluid state, which, mixing with the soil, brings about an union of the oily and watery parts, in the manner demonstrated by the experiment. When the under stratum consists of a rich vegetable mould, the effects of Burn-baking will be lasting. But when the soil happens to be thin and poor, the first crop frequently suffers before it arrives at maturity. The farmer, therefore, who is at the expence of paring and burning a thin soil, should bestow upon it a portion of rotten dung, or shambles manure, before the ashes are spread, in order to supply the deficiency of oily particles. In consequence of this prudent management, the crop will be supported during its growth, and the land will be preserved in health and vigour. Hitherto I have considered plants as nourished by their roots. I shall now take a view of them as nourished by their leaves. An attention to this part of the vegetable system is eſsentially neceſsary. Vegetables that have a succulent leaf, such as vetches, peaſe, beans, and buck-wheat, draw a great part of their nourishment from the air, and on that account impoverish the soil leſs than wheat, oats, barley, or rye, the leaves of which are of a firmer texture. In this manner the vegetable creation renders the air pure, by aſsimilating to itself those putrescent particles, which, if not removed, would render the atmosphere unfit for animal respiration. Rape and hemp are oil-bearing plants, and, consequently, impoverishers of the soil; but the former leſs so than the latter, owing to the greater succulency of its leaf. The leaves of all kinds of grain are succulent for a time, during which period the plants take little from the earth; but as soon as the ear begins to be formed, they lose their softneſs, and diminish in their attractive power. The radical fibres are then more vigorously employed in extracting the oily particles of the earth, for the nourishment of the seed.

not, as we affirmed, operate to the full extent and perfection of what it gives and contributes of neceſsary and constituent matter, without the soil and temper of the climate co-operate, which otherwise retards CHAP. I.

Vegetables being fixed to a place, have few offices to perform. An increase of body and maturation of their seed, seems all that is required of them. For these purposes, Providence has wisely bestowed upon them organs of a wonderful mechanism. The anatomical investigation of these organs, is the only rational method of arriving at any certainty concerning the laws of the vegetable œconomy. Upon this subject Dr. Hales judiciously observes, "That as the growth and preservation of vegetable life is promoted "and maintained, as in animals, by the very plentiful and regular motion of their fluids, "which are the vehicles ordained by Nature to carry nutriment to every part, it is "therefore reasonable to hope, that in them also, by the same method of inquiry, "considerable discoveries may in time be made; there being, in many respects, a great "analogy between plants and animals."

The seed of a plant, after it has dropt from the ovarium, may be considered as an impregnated ovum, within which the embryo plant is securely lodged. In a few days after it has been committed to the earth, we may discern the rudiments of the future plant. Every part appears to exist in miniature. The nutritive juices of the soil insinuate themselves between the original particles of the plant, and bring about an extension of its parts. This is what is called the Growth of the vegetable body. With regard to this increase by addition and extension, there seems to be a great analogy between the animal and vegetable kingdoms. I have already endeavoured to prove, that oily particles constitute the chief nourishment of plants and animals; and as I apprehend that much depends upon a proper investigation of the subject, I shall occasionally introduce some other proofs in support of my opinion. Every one knows that animals, instead of being strengthened, are enfeebled by a supply of improper nourishment. It is the same thing with regard to vegetables; but with this difference, that animals refuse whatever is improper, while vegetables, from their paſsive nature, must be content with what we give them. The impregnated ovum of every animal, after it has paſsed down the Fallopian tube, and fixed itself to the bottom, or side, of the uterus, is found to contain the tender embryo within two membranes called Chorion and Amnion. In this situation the embryo could not long subsist without a supply of nourishment. Nature has therefore bestowed upon it a placenta and umbilical chord, through which the blood and juices of the mother are transmitted, for its preservation and increase. Seeds are disposed by Providence nearly in the same manner. They have two coverings, answering to the Chorion and Amnion, and two lobes which perform the office of the placenta. These lobes constitute the body of the seed, and, in the farinaceous kinds, they are the flour of the grain. Innumerable small veſsels run through the substance of the lobes, which, uniting as they approach the seminal plant, form a small chord to be inserted into the body of the germ. Through it the nutriment supplied by the placenta, or lobes, is conveyed for the preservation and increase of the embryo plant. In order that I may be

BOOK I. 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. This we find, that the hot and warmer regions

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clearly understood, it will be neceſsary to observe, that the lobes of most farinaceous grains are fixed in the earth: They are therefore improperly termed seminal leaves, being rather the placenta, or cotyledons of the plant. On the contrary, vegetables that have an oily seed, as rape, hemp, line, and turnip, carry their lobes upwards, and spread them upon the surface, in the form of broad leaves. These, though they perform the office of a placenta, are properly seminal leaves; and to this distinction I shall adhere. Fig. 1. represents the body, or placenta, of a bean, with its germ, radicle, umbilical chord, and ramifications. *a*. The germ. *b*. The body, or placenta, with the umbilical chord and ramifications. *c*. The radicle. Fig. 3. represents the placenta, or seed-leaves, of a turnip, with its radicle and germ. *a*. The germ. *b*. The placenta, or seed-leaves. *c*. The radicle. Fig. 2. represents the germ of a grain of wheat, with its root and capsule, containing the milky juice for the nourishment of the tender plant. *a*. The origin of the crown from whence the second roots spring. *b*. The pipe of communication between the first roots and the crown, which in this early stage of the plant is covered with a membranous sheath. *c*. The grain with its first roots. As soon as the coronal, or spring root, puts out, the pipe of communication throws off its covering, and appears naked, as in Fig. 4. *b*.—Regarding these two kinds of roots, the œconomy of Nature is wonderful. The seminal root, lying deep, nourishes the tender plant during the severity of winter; but when the spring comes on, and it is neceſsary that the plant should advance in size, the coronal root then shoots forth and spreads its fibres just within the surface, where the land is always the richest. When the seed happens to be buried very deep, Nature lengthens the pipe of communication, and on no account will form the crown, from whence the spring roots are sent forth, till the surface is obtained: Fig. 4.——I believe I do not err when I call this vegetable instinct. To illustrate the subject of vegetation, let us take a view of what happens to a bean after it has been committed to the earth. In a few days, sooner or later, according to the temperature of the weather and disposition of the soil, the external coverings open at one end, and disclose to the naked eye part of the placenta, or body of the grain. This substance consists of two lobes, between which the seminal plant is securely lodged. Soon after the opening of the membranes, a sharp-pointed body appears: This is the root. By a kind of principle, which seems to carry with it some appearance of instinct, it seeks a paſsage downwards, and fixes itself into the soil. At this period the root is a smooth and polished body, and perhaps has but little power to absorb any thing from the earth, for the nutriment of the germ. The two lobes now begin to separate and the germ, with its leaves, may plainly be discovered. As the germ increases in size, the lobes are further separated, and the tender leaves being closely joined, push themselves forward in the form of a wedge. These leaves take a contrary direction to the root. Influenced by the same miraculous instinct, if I may be allowed the expreſsion, they seek a paſsage upward, which having obtained, they lay aside their wedge-like form, and

Fig. 2.

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Fig. 3.

Fig. 4.

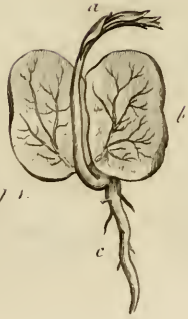

Fig. 1.

Fig. 3.

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produce the tallest and goodliest trees and plants, in stature and other properties far exceeding those of the same species, born in the cold North; so as what is a giant in the one, becomes a pumilo, and, in comparison,

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spread themselves in a horizontal direction, as being the best adapted for receiving the rains and dews. The radicle, every hour increasing in size and vigour, pushes itself deeper into the earth, from which it now draws some nutritive particles. At the same time the leaves of the germ, being of a succulent nature, assist the plant, by attracting from the atmosphere such particles as their tender vessels are fit to convey. These particles, however, are of a watery kind, and have not in their own nature a sufficiency of nutriment for the increasing plant. Vegetables and animals, during their tender states, require a large share of balmy nourishment. As soon as an animal is brought into life, the milk of its mother is supplied in a liberal stream, while the tender germ seems only to have the crude and watery juices of the earth for its support. In that, however, we are deceived. The Author of Nature, with equal eye, watches over the infancy of all his works. The animal enjoys the milky humour of its parent. The vegetable lives upon a similar fluid, though differently supplied. For its use the farinaceous lobes are melted down into a milky juice, which, as long as it lasts, is conveyed to the tender plant by means of innumerable small vessels, which are spread through the substance of the lobes. These vessels enter the body of the germ, and perform the office of an umbilical chord. Without this supply of balmy liquor, the plant must inevitably have perished; its root being then too small to absorb a sufficiency of food, and its body too weak to assimilate it into nourishment. How beautiful is the resemblance between this and the imagery of Lucretius!

> Hinc ubi quæque loci regio opportuna dabatur,
> Crescebant uteri terræ radicibus apti:
> Quos ubi tempore maturo patefecerat aetas
> Infantum fugiens humorem, aurasque petissens,
> Convertebat ibi natura foramina terræ,
> Et succum venis cogebat fundere apertis
> Consimilem lactis, sicut nunc fœmina quæque
> Cum peperit, dulci repletur lacte, quod omnis
> Impetus in mammas convertitur ille alimenti. Lib. v. l. 807.

Turnips, and all the tribe of Brassicas, in opposition to most of the legumenous and farinaceous plants, spread their seminal leaves upon the surface. These leaves contain all the oil of the seed, which, when diluted by the moisture of the atmosphere, forms an emulsion of the most nourishing quality. How similar is this juice to the milk of animals! On account of its sweetness, the seminal leaves are greedily devoured by the fly. This demonstrably proves that oil constitutes the nourishment of plants in their tender state; and, by a fair inference, we may suppose that it also nourishes them as they advance

BOOK I.

but a shrubby dwarf in the other; deficient of that active spirit, which elevates and spreads its prolific matter and continual supplies without check, and is the cause of the leaves deserting the branches, whilst those trees and plants of the more benign climate are clad in perennial verdure; and those herbaceous plants, which with us in the hottest seasons hardly perfect their seeds before winter, require to be near their genial beds and nurse, and sometimes the artificial heat of the hot-bed. Lastly, to all this I would add that other cheerful vehicle, Light, which the gloomy and torpent North is so many months deprived of, the too long seclusion whereof is injurious to our exotics kept in the conservatories; since however tempered with heat, and duly refreshed, they

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in growth. A grain of wheat, as soon as the germ has made its appearance, shows the milky liquor to the naked eye. As the plant increases in size, the balmy juice diminishes, till at last it is quite exhausted. The umbilical vessels then dry up, and the external covering of the grain appears connected to the root in the form of a shrivelled bag. See Fig. 4. *c*.—Here is no mortality: From the moment that the seed is lodged in its parent earth, the vegetative soul begins its operations, and, in one continued miracle, proves the wisdom and bounty of an Almighty Providence. It is worthy of observation, that farinaceous vegetables and oviparous animals are nourished, in their tender states, nearly in the same manner. We have already seen that the embryo plant is supported by the farina melted down into a milky liquor, and conveyed into its body by means of an umbilical chord, at a time when the radicle was unable to supply a sufficiency of nutriment. In like manner an oviparous animal, from the time it is brought into light, seems to receive all its nourishment from without. This, however, is only an appearance: The yolk of the egg, remaining entire during incubation, is received into the body of the animal, and in a manner similar to the passage of the milky juice of the vegetable, is slowly conveyed into the vessels of the tender chick. Thus a sweet nourishment is prepared at a time when neither the industry of the animal, nor the attention of its mother, could have procured a sufficient supply. How beautiful are the general laws of Providence! The more we explore them, the more we have cause for wonder and astonishment! Every thing is wisely disposed; nothing is fortuitous; all is order, regularity, and wisdom:

> Was every faultering tongue of man,
> Almighty Father! silent in thy praise,
> Thy works themselves would raise a general voice,
> Ev'n in the depths of solitary woods,
> By human foot untrod; proclaim thy power,
> And to the quire celestial THEE resound,
> Th' eternal cause, support, and end of all. THOMSON.

grow sickly, and languish without the admiſsion of light as well as air, as I have frequently found [m].

[m] If any number of plants are placed in pots in a room which only admits the light by a single hole, the stems will incline, or direct themselves towards that side. In thick forests, the young trees always lean to the side where the light penetrates. The new shoots of an espalier detach themselves from the wall which robs them of the air, the sun, and the light. It is in quest of the same excellent gifts of Nature, that the lateral branches of trees, abandoning the direction of the stem, spread and extend themselves in a direction parallel to the soil, even when planted on a declivity. Trunks are not, however, the only parts of plants which direct their course towards the air and the light of the sun. There are flowers, which, quitting their perpendicular direction, present their surface directly to that luminous body, and follow it in its diurnal course. This sort of motion has been called by some writers, NUTATION; and the plants which are subject to it, have been termed *Heliotropæ;* that is, turning with the sun. The story of the Sun-flower, in Ovid's Metamorphoses, is confirmed by daily observation. Thomson beautifully describes its affection:

> But one, the lofty follower of the sun,
> Sad when he sets, shuts up her yellow leaves,
> Drooping all night; and, when he warm returns,
> Points her enamour'd bosom to his ray.

Most of the discous flowers, by some power unknown to us, follow the sun in his course. They attend him to his evening retreat, and meet his rising lustre in the morning with the same constant and unerring law.

CHAPTER II.

Of the Seminary, and of Transplanting.

BOOK I. SEMINARY.

1. *QUI Vineam vel Arbustum constituere volet, Seminaria prius facere debebit*, was the precept of *Columella*, (de Arb. cap. 1.) speaking of vineyards and fruit-trees; and doubtleſs we cannot purſue a better course for the propagation of timber-trees: For though it ſeem but a trivial design, that one ſhould make a nurſery of foreſters; yet it is not to be imagined, without the experience of it, what prodigious numbers a very ſmall ſpot of ground, well cultivated, and deſtined for this purpoſe, would be able to furniſh towards the ſending forth of yearly colonies into all the naked quarters of a lordſhip or demeſne; being, with a pleaſant induſtry, liberally diſtributed amongſt the tenants, and diſpoſed of about the hedge-rows, and other waſte and uncultivated places for timber, ſhelter, fuel, and ornament, to an incredible advantage. This being a cheap and laudable work, of ſo much pleaſure in the execution, and ſo certain a profit in the event, when once well done, (for, as I affirmed, a very ſmall plantarium, or nurſery, will, in a few years, ſtock a vaſt extent of ground,) has made me ſometimes in admiration at the univerſal negligence; as well as raiſed my admiration, that ſeeds and plants of ſuch different kinds, ſhould, like ſo many tender babes and infants, ſuck and thrive at the ſame breaſts; though there are ſome indeed will not ſo well proſper in company, requiring peculiar juices: But this niceneſs is more conſpicuous in flowers and the herbaceous offſpring, than in foreſters, which require only diligent weeding and frequent cleanſing, till they are able to ſhift for themſelves; and as their veſſels enlarge and introſume more copious nouriſhment, they often ſtarve their neighbours.

2. Having therefore made choice of ſuch ſeeds as you would ſow, by taking and gathering them in their juſt ſeaſon, that is, when dropping ripe, and as has been ſaid, from fair thriving trees, and found out ſome fit piece of ground, well fenced, reſpecting the ſouth-eaſt rather than

the full south, and well protected from the north and west, let it be broken up the winter before you sow, to mellow it; especially if it be a clay, and then the furrow should be made deeper, or so at least as you would prepare it for wheat: Or you may trench it with the spade, by which means it will the easier be cleansed of whatsoever may obstruct the putting forth, and insinuating of the tender roots.

> Qui serere ingenuum volet agrum,
> Liberat arva prius fruticibus;
> Falce rubos, filicemque resecat. BOETH. lib. iii. *Met.* I.
>
> He that for wood his field would sow,
> Must clear it of the shrubs that grow;
> Cut brambles up, and the fern mow.

Having given it a second stirring, immediately before you sow, cast and dispose it into rills, or small narrow trenches, of four or five inches deep, and in even lines, at two feet interval, for the more commodious runication, hawing, and dreſsing the trees: Into these furrows, about the new or increasing moon, throw your Oak, Beech, Ash, Nuts, all the glandiferous seeds, mast and key-bearing kinds, so as they lie not too thick, and then cover them very well with a rake, or fine-toothed harrow, as they do for pease: Or, to be more accurate, you may set them as they do beans, especially the Nuts and Acorns, and every species by themselves, for the Roboraria, Glandaria, Ulmaria, &c. which is the better way [n]: This is to be done at the latter end of October, for the autumnal sowing, and in the lighter ground about February, for the

[n] The most natural, direct, and general way of raising trees and plants is from seeds. In order to this, proper soils must be prepared for them, as suitable as poſsible to their respective natures; and when the ground is ready, and well furnished with the embryo plants, it is properly and significantly called the Seminary. Its situation should be as near the nursery as poſsible; and as it is of the utmost consequence to preserve the young plants from being cropped by hares in the winter, the ground should be fenced round with pales of a sufficient height. In the beginning of winter let the land be trenched about two spits deep, working the sward to the bottom; and during the spring, the surface should be carefully kept clear from weeds. About Midsummer, unleſs the soil be very rich, let some rotten dung be spread over the surface, after which it should again be trenched. By this second operation the rotten swarth will be brought to the top, and the soil will put on a mellow appearance. From Midsummer to September, the ground should be kept clear of weeds; and just before the seeds are committed to it, it should again be

BOOK I. vernal. For other seminations in general, some divide the spring in three parts, the beginning, middle, and end; and the like of the autumn, both for sowing and planting, and accordingly prepare for the work such nursery furniture as seems most agreeable to the season;

Proinde nemus sparsa cures de glande parandum:
Sed tamen ante tuo mandes quam semina campo,
Ipse tibi duro robustus vomere fossor
Omne solum subigat late, explanetque subactum.
Cumque novus fisso primum de germine ramus
Findit humum, rursus ferro versanda bicorni
Consita vere novo tellus, cultuque frequenti
Exercenda, herbæ circum ne forte nocentes
Proveniant, germenque ipsum radicibus urant.
Nec cultu campum cunctantem urgere frequenti,
Et saturare fimo pudeat, si forte resistat
Culturæ; nam tristis humus superanda colendo est. RAPINUS.

Then see your hopeful grove with Acorns sown;
But e'er your seed into the field be thrown,
With crooked plough first let the lusty swain
Break up, and stubborn clods with harrow plane:
Then, when the stem appears, to make it bare,
And lighten the hard earth with hough, prepare:
Hough in the spring, nor frequent culture fail,
Lest noxious weeds o'er the young wood prevail.
To barren ground with toil large manure add;
Good husbandry will force a soil that's bad.

Note, that six bushels of Acorns will sow or plant an acre at one foot's distance: And if you mingle amongst the Acorns the seeds of

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trenched, which will effectually produce an uniform mixture of all the parts. This being done, let the ground be levelled, and the beds laid out for the different purposes, reserving proper portions for the reception of such seeds as must be sown in spring.

A very judicious planter has recommended to me the following method of making a Seminary. Trench the ground in November eighteen inches deep, if the soil will admit of it; but where the staple is too thin, one foot will be sufficient, in which case the sward must be pared off very thin, and laid in the bottom of the trench. The following year let this land be cultivated with a crop of cabbages, turnips, or rape, which must be eat off by sheep. After this a common digging will be sufficient, previous to its being formed into beds for the reception of the seeds. It will be necessary to remark upon this mode of preparation, that the urine of sheep is considered as one of the most cherishing manures for all plants raised in a Seminary.

Genista Spinosa, or Furze, they will come up without any damage, and for a while prove a sufficient fence, and will be killed by the shade of the young Oaklings, before they become able to do them any prejudice.

One rule I must not omit, that you cast no seeds into the earth whilst it either actually rains, or that it be over sobbed, till moderately dry.

The Seminary being now ready, it follows that the planter should be instructed in the manner of sowing and raising the seeds of Forest-trees; and as Bradley, Miller, Hanbury, Weston, and Mawe, have published useful directions upon this head, I flatter myself that I shall be thought right in transcribing their authorities for the manner of raising the following trees from seed.

OAK.

The Oak, the Pride and Glory of the Forest, is a native of this country, and suits itself to all sorts of soils. It is of slow growth; but its cultivation is of the utmost consequence to this nation. In order to raise this tree, let the acorns be procured from straight thriving trees, when they are full ripe and begin to fall. In February or March, (or in October, if the autumnal sowing be more agreeable,) prepare the beds four feet wide; rake the earth out into the alleys two inches deep, and draw lines acrofs the bed at four inches asunder with a sharp-pointed stick; on these lines lay the acorns at about two inches distance from each other; when the bed is finished, prefs the seeds gently down with the back of the spade to keep them in their places, then spread the earth over them two inches thick, and rake the beds even; by their being planted in rows four inches asunder, a two-inch hoe can pafs betwixt the rows without hurting the plants, by which the weeds are more easily destroyed, and the stirring the earth so much will cause the plants to grow the more, which advantage is lost if they are sown broadcast. It will be neceſsary to place some traps in the alleys to catch the mice, particularly after autumnal sowing; the crows are also very fond of acorns; therefore it will be proper to guard against these enemies, or all your labour will be lost. For two years the plants may remain in the seed-bed, with only the care of weeding them constantly in summer, and spreading a little fresh earth and ashes among them against the winter. They must then be transplanted, in March or October, either where they are to remain, or else into the nursery: if into the nursery, it must be in rows two feet and a half asunder, and each plant at eighteen inches distance, where they must be constantly hoed, and the ground dug between them before winter, till they are planted out for timber.

ELM.

The Wych Elm is the only one that ripens its seeds well in this country. The seed must be gathered the beginning of June, laid in a dry place for a few days, and then it will be fit to sow. After having formed the beds four feet wide, rake out the earth, about two inches deep, and sift it into the beds again, except leaving about half an inch of it to cover the seeds; rake it level again, and flat it a little with the back of the spade,

BOOK I. To this might something be expected concerning the watering of our Seminaries and new plantations; which indeed require some useful directions, especially in that you do by hand. Pour it not with too great a stream on the stem of the plant, which washes and drives away the

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then sow the seeds, and sift the remaining earth over them. When you have sown the seeds, the beds must be hooped, and covered with mats to screen them from the sun; but when it rains, take them off; and if it be very dry weather, the beds must be frequently and gently watered. In about a month, many of the young plants will appear; towards September the mats may be taken away, but before winter the beds must be well weeded, and a quarter of an inch of ashes sifted over them. In spring the rest will appear, and during the summer they must be constantly weeded, frequently watered in dry weather, and have some earth sifted over them. The February following they must be taken out of the seed-bed and planted in rows three feet asunder, and each plant at eighteen inches distance, where they are to remain with the usual care of digging between the rows, and hoeing the weeds in summer.

BEECH.

Gather a sufficient quantity of mast, about the middle of September, when it begins to fall; spread it upon a mat, in an airy place, for six days, to dry; and after that you may either proceed to sowing it immediately, or you may put it up in bags, in order to sow it nearer the spring; which method I would rather advise, as it will keep very well, and there will be less danger of having it destroyed by mice or other vermine, by which kinds of animals these seeds are greatly relished. The ground being ready for the seeds, line your beds out four feet wide, with alleys a foot and a half or two feet broad, for this is the properest width for raising the seeds of all sorts of forest-trees; let the earth be raked out of each bed, one inch deep; and, after having levelled the bottom, and gently tapped it down with the spade, sow the seeds all over it, even and regular; then tap them down with the back of the spade, and cover them over with mould an inch deep. In the spring of the year, many of the plants will make their appearance, whilst others will not come up till the following spring. After they have been two years in the seminary, they must be planted, in the nursery way, on some double-dug ground. The rows should be two feet and a half asunder, and the plants at eighteen inches distance in the rows. The rows ought to be kept clean of weeds in the summer, and dug between every winter. Here they may remain till they are to be planted out for continuance.

ASH.

Procure the keys from healthy young thriving trees in October or November; rake some of the earth off into the alleys, to lower the bed about an inch; sow the keys moderately thick, then throw the earth back again lightly with a spade, or else sift it over them, an inch thick, and rake it level. In spring, with a very small light iron rake, (the teeth about an inch asunder,) rake off the moss, pull up the weeds, and again sift a little earth over the beds. They will want no other care the first year, except weeding. The

mould from the roots and fibres; but at such distance as it may percolate into the earth, and carry its virtue to them, with a shallow excavation, or circular basin, about the stalk; and which may be defended from being too suddenly exhausted and drunk up by the sun, and taken away

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second spring, in the first open weather in February, rake off very gently the earth as before, sift fresh over them, about half an inch thick, and in March and April the young plants will appear in plenty. During the summer they must be constantly weeded, and in very dry weather, now and then watered; in October weed them again, and sift some coal-ashes half an inch thick over them; but if the heavy rains in the summer have laid the roots bare, it will be necessary to sift a little earth amongst them first. No persons, unless they have practised this method of sifting earth and ashes over their seedling plants before winter, can conceive the advantage they receive from it; it strengthens the stems, prevents mofs from growing amongst them, and secures them from being turned out of the ground by the frost. The next spring prepare some beds six feet wide, with a path of two feet betwixt each; plant all of a size in each bed, at one foot square, first shortening the tap-roots, and also the side ones; in this bed they must remain for two years, hoeing the ground when any weeds appear, and against winter sprinkling a few ashes amongst them. After standing at this distance for two years, they will want removing; they must then be planted out into your nursery, in rows three feet asunder, and each plant at one foot distance, where they are to remain till they are wanted for planting out for good; but observe to keep the weeds constantly down when small, for then a labourer with a Dutch hoe can clean near half an acre in a day, and your trees will thrive amazingly by such a practice.

As the Ash keys do not make their appearance till the second spring, some judicious persons recommend them to be bedded in dry mould, and treated in the manner of haws. This method has many apparent advantages. In general the keys are sown too thick, which makes the plants come up tall and weak; a practice much to be condemned.

LARCH.

In the winter let a sufficient quantity of cones be procured, and kept till the spring of the year. Just before sowing, let them be opened or torn into four quarters by a knife, the point of which must be thrust exactly down the centre, so that the seeds in their respective places may not be damaged. Formerly, great pains were bestowed in getting at the seeds, by cutting off the scales of the cones singly, and letting the seeds drop. This occasioned great expence to those who wanted a quantity of seeds; so that it is now wholly laid aside, for the more easy method of opening them with knives, and then threshing them. A certain price is generally allowed per thousand to the poor for opening them. When a sufficient quantity is opened, they should be threshed in a room, which will divide the scales, and dislodge the seeds, without injuring many of them. Three thousand cones will generally produce about a pound of good seed. The cones being sufficiently broken, and the seeds threshed out, they should be winnowed or sieved, to have clear seeds; after which they will be ready for sowing in April. Let the seminary

BOOK I. before it grow mouldy. The tender stems and branches should yet be more gently refreshed, lest the too intense rays of the sun darting on them, cause them to wither; as we see in our fibrous flower-roots newly set. In the mean time, for the more ample young plantations of forest

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consist of a spot of fine light earth, and let the seeds be sown in beds a quarter of an inch deep. After the plants have made their appearance, they should be gently refreshed with water in dry weather, and carefully kept clean of weeds during the whole summer. By the autumn they will not have shot more than an inch or two; and in spring they should be pricked out in beds about three inches asunder. The second spring they must be taken out of these beds with care, and planted in the nursery, in rows three feet asunder, and the plants eighteen inches from each other; and here they may remain until they are fit to plant out for good, which will be about the second or third year after. When they grow well in the nursery, I would advise them to be planted out where they are to continue, after having got two years strength, for these trees always thrive best that are removed small from the nursery, if they are only of a sufficient size not to be injured by the weeds. For an improved method of raising the Larch, consult its history in the Chapter on Pines.

CHESNUT.

Before you attempt planting any Chesnuts, whether Foreign or English, put them into a tub of water, and let those that swim be thrown away. The middle of February draw four drills along each bed, at a foot distance and five inches deep; in these drills place the nuts at about four inches asunder, and cover them well. When the plants appear, weed them very carefully, and if you make use of an hoe, it must be done with great care, for fear of hurting the tender bark; but if any weeds break off within the ground, a carpenter's chisel, about an inch broad, will be of great use in getting the roots up without damaging the plants. In the seminary they must stand two years, be well weeded and earthed up before winter, and then some ashes spread amongst them. In February they will want transplanting into the nursery (the ground being first double dug) in rows three feet asunder, and each plant at eighteen inches distance; after they have remained there another year, cut them down to the ground, by which they will shoot very strongly with handsome straight stems, and overtake those that have not undergone the same operation. Here they may remain four or five years, keeping them clean from weeds, and digging between the rows.

WALNUT.

Having marked the trees that produce the finest nuts, either for thinness of shell or goodness of taste, we must proceed to gather them when they begin to fall. But as collecting them by the hand would be tedious, they may be beat down by long poles prepared for that purpose. Having procured the quantity wanted, let them be preserved, with their husks on, in sand, till the beginning of February, which is the time for planting;

and other trees, I should think the hydraulic engine called the *Quench-fire*, (described in the Philosophical Transactions, number 128,) might be made very useful, if rightly managed, and not too violently pointed against any single trees, but so exalted and directed, as the stream being

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them. This is to be done in the following manner: Let drills be made acroſs the seminary, at one foot asunder, and about two inches and a half deep, and let the nuts be put into them at the distance of about four inches. In spring the young plants will come up. In this situation they should continue for two years, being constantly kept clear of weeds; when they will be of a proper size to plant out in the nursery. The ground should be prepared, as has been always directed, by double digging; and the trees, having their tap-roots shortened, should be planted therein, in rows two feet and a half asunder, and at the distance of a foot and a half in the rows. Here they may remain, with the same culture as has been all along directed for the management of timber-trees, till they are of a proper size for planting out for good. If they are designed for standards to be planted in fields, &c. before they are taken out of the nursery they should be above the reach of cattle, which would otherwise wantonly break their leading shoots, though they do not care to eat them, on account of their extraordinary bitterneſs. They ought likewise to be removed with the greatest caution, and the knife should be very sparingly applied to the roots. They must also be planted as soon as poſsible after taking up; and this work should be always done soon after the fall of the leaf, in the manner that will be directed for planting out standard timber-trees. If these trees are intended to form a wood, for which purpose they answer extremely well, I would advise to take them out of the nursery when they are about three or four feet high, and to plant them about three yards asunder; and, after their heads begin to touch, they should be thinned. By this means, these large and branching trees will be drawn up, with beautiful stems, to a great height. At the last thinning of the trees, the standards should be left at about thirty feet distance: But if the owner expects to reap the benefit of the fruit, the distance ought to be seven or eight feet more.

LIME.

Procure the seeds from the red-twigged Lime, by beating them down with a pole in October; and spread them in a dry place for a few days before you sow them: Prepare your beds four feet wide, and rake the earth out about an inch deep; level the bed, and then sow the seeds about an inch asunder, preſsing them down gently with the back of the spade, and covering them. In spring they will appear, and must be constantly weeded, and watered a little in very dry weather; before winter, sift some ashes over them to destroy the moſs. The plants must remain in the seed-bed two years, and then they will be fit to plant out into the nursery in rows two feet and a half asunder, and each tree at eighteen inches distance; but before they are planted, shorten the roots a little, and cut off any side-branches. In this place they may remain for several years, (for they will bear removing at any size,) with hoeing the weeds down in summer, and digging between them every year; but as you want them, it is better to take away every other tree, which, by giving more air, will increase the growth of those that remain.

spread, the water might fall on the ground like drops of rain; which I should much prefer before the barrels and tumbral way. Rain, river, or pond-waters, reserved in tubs or cisterns, simple or enriched, and abroad in the sun, should be frequently stirred, and kept from stagnation.

HORSE-CHESNUT.

Put the nuts in a tub of water, and throw away all that swim; plant them in the same manner as the other Chesnuts, except that they are better put in the ground in October; for if they are kept till the spring many will miscarry. In spring they will appear, and when one year old they must be taken up, the tap-roots shortened, and then planted in the nursery, in rows three feet asunder, and each plant at eighteen inches distance: but there is this difference from the other Chesnuts, that these make their whole shoot in about three weeks or a month's time, and after that only increase in thickneſs; therefore during that period it would certainly forward them to give the ground an hoeing, though it was dug in the spring; and if the beginning of May should prove dry, which is sometimes the case, it will be proper to give the plants a few gentle waterings. Be careful not to prune these trees after they are planted, for they will not bear it; and indeed their own beautiful natural shape indicates, that they want no aſsistance from art.

SYCAMORE.

In the autumn, when the keys are ripe, they may be gathered, and in a few days after sown, as has been directed for the Ash. In spring the plants will appear, and make a shoot of about a foot and a half by the autumn following, if the ground of the seminary be tolerably good, and they are kept clean from weeds. The spring after they come up, they should be planted in the nursery, in rows two feet and a half asunder, and their distance in the rows must be one foot and a half. Here they may remain till they are big enough to plant out for good, with no further trouble than taking off unsightly side-branches, and digging between the rows.

MAPLE.

If a quantity of these trees are wanted, they may be raised in the same manner as the Sycamore, and managed accordingly.

MULBERRY.

This tree is propagated two ways; by seeds, and by layers. Where the former can be procured, it is the most expeditious way of raising great quantities; and whoever has a correspondence in the south of France, or in Italy, may, through that channel, obtain them. Having the seeds ready, let a fine warm border of rich mellow earth be prepared; and let this border be hooped, in order to support mats to defend the young plants, at their first appearance, from frosts. If no such border can be easily had, it will be proper to make a gentle hot-bed, and cover it with rich fat mould: This also must be hooped as the border. Then sow the seeds in little drills, about a quarter of an inch deep. The middle of March

3. Your plants beginning now to peep, should be earthed up, and comforted a little, especially after breaking of the greater frosts, and when the swelling mould is apt to spue them forth; but when they are about an inch above ground, you may, in a moist season, draw them up

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is the best time for this work; and when the young plants appear, which will be in about six weeks, they must be constantly covered with mats in the night-time to guard against the effects of frost. During the summer they should be kept clear from weeds, and covered from the extreme heat of the sun while the hot months continue. Whenever any cloudy or rainy weather approaches, the mats should be always taken off, that the plants may enjoy the benefit of it. By thus carefully nursing the beds, keeping them clear from weeds, watering the plants in dry seasons, covering them from the parching sun, and uncovering them again in the night, or when the weather is cloudy or rainy, the plants by autumn will be got pretty strong; though not so strong as to be left to themselves. The following winter they will require some care. When the frosts approach, they must be carefully covered with the mats, as in the spring; for without this protection many of them would be injured, and the greatest part killed, at least down to the ground. In this bed they may stand two years, when they will be strong enough to plant out in the nursery. The ground for this purpose being double dug, the young plants should be set in rows, at two feet and a half distance, and one foot and a half asunder in the rows. There they may remain till they are of a sufficient size to plant out for good.

HORNBEAM.

In the autumn the seeds are ripe; when, having gathered a sufficient quantity for the purpose, let them be spread upon a mat a few days to dry. After this, they should be sown in the seminary, in beds four feet wide, with an alley of about two feet, in the manner directed for raising the Ash. In this bed they will remain till the second spring, when they will make their appearance. During the summer of their concealment, the weeds should constantly be plucked up as soon as they peep; for if neglected the fibres of their roots will strike so deep as to occasion many of the seeds to be drawn out on weeding the ground. After the young plants appear, they should constantly be kept clear of weeds; and if they were now and then gently refreshed with water in dry weather, it would prove highly serviceable to them. In the spring following they may be taken out of these beds, and planted in the nursery.

MOUNTAIN ASH, OR QUICKEN-TREE.

Having procured a sufficient quantity of berries, they should be sown, soon after they are ripe, in the seminary, about half an inch deep, in beds made as before directed: they frequently lie till the second spring before they make their appearance. In the spring following let them be taken from the seed-bed, and planted in the nursery.

BOOK I. where they are too thick, and set them immediately in other lines or beds prepared for them; or you may plant them in double fosses, where they may abide for good and all, and to remain till they are of a competent stature to be transplanted; where they should be set at such distances

BIRCH.

The commen Birch is raised from seeds, and the varieties are continued by layers. The seeds should be gathered in the autumn before they drop from their scales, which will happen soon after they begin to open. In a day or two they should be sown in the seminary, in a superficial manner; and after they are come up, the plants should be carefully kept clear of weeds for the first summer. The spring following they may be planted out in the nursery: the rows must be two feet and a half asunder, and the plants a foot and a half distant in the rows. Here they may continue till they are of a sufficient size to be planted out where they are to remain.

SCOTCH FIR.

Having obtained a quainty of good seeds, let them be sown in beds of light loamy mould, sometime in the beginning of April, or sooner, if the weather be favourable. In about six weeks the young plants will make their appearance, and then is the time to watch them carefully; for if the sparrows, or other birds, once find them out, they will destroy them as fast as they come up. In order, therefore, to secure the crop, it will be proper to have the beds well netted soon after being sown, and strings of sewelling drawn acrofs. As soon as the plants are come up and have parted with their husks, the netting and sewelling may be removed: all this summer the beds must be kept clear of weeds, and in the latter end of the following March, or beginning of April, the plants must be pricked out, at the distance of four inches from each other, into beds properly prepared. After remaining in these beds two years, the plants should be removed into the nursery, where they should be planted in rows three feet asunder, and the trees one foot and a half distant in the rows. In this place they must continue till they are required to be planted out for good. And here it will be proper to remark, that bleak and cold situations require the firs to be planted from the seed-bed; of which a particular account is given in the twenty-second chapter of the first book.

WILD PINE.

This tree may be raised in the same manner as the Scotch Fir; and the cones should be prepared and the seeds obtained according to the directions given for that tree. They should also be sown at the same time; and in about six weeks the young plants will appear. They will make a short shoot the first summer; and in the spring following they should be pricked out in the nursery beds, at a foot asunder each way. After your plants have taken to the ground they will want no farther care than keeping them clean of weeds, till the latter end of September, or beginning of April following; in either which months they should be planted out for good, if posfible; but if the ground cannot be got ready for their

as their several kinds require: but if you draw them only for the thinning of your Seminary, prick them into some empty beds (or a plantarium purposely designed) at one foot interval, leaving the rest at two or three.

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reception, they must undergo a second removal in the nursery way, otherwise they will mostly die when planted out; for it is difficult to make this tree thrive when grown large, if it has not been used to constant moving.

WEYMOUTH PINE.

Weymouth Pines being the most beautiful and most valuable of all the different sorts, every Gentleman should plant some of them; it is from these trees that our ships are furnished with masts; the trees now produce good seeds here, therefore may be procured in greater plenty than they used to be. If these seeds are not sown in boxes or pots, which is by much the best way, they must be covered with mats in the heat of the day, during the violent heat of the summer, and uncovered every night; but if sown in pots or boxes, they will be more easily moved into the shade in summer, and brought back to a warmer situation in winter. April is the season for sowing these and other Pines. After the plants are come up, sift some earth amongst them, if they appear weak, or are beaten down after heavy rains, and before winter, sift some ashes over them: then in spring plant them out into beds six feet wide, at eight inches asunder each way: there let them remain two years, being constantly weeded, and the earth frequently stirred up with a small hoe, and before winter spread some ashes among them. The second spring they must be planted out into rows, eighteen inches asunder, and each row at three feet distance, where they may stand two or three years; and if they are not then intended to be planted out where they are to remain, they must be taken up, and planted again at two feet distance from each other, and the rows three feet asunder. This tree will bear planting out when six or eight feet high; though not so many will live as when planted at a lower standard.

SWAMP PINE.

Its propagation is the same as the Weymouth Pine; and the planting out, and after-management of the trees, is also similar.

STONE PINE.

The Stone Pine produces large eatable seeds, and from their size they can easily be planted at what distance you please. In spring make some drills an inch deep, and at six inches asunder; in these plant the seeds about four inches from each other, and cover them with the earth near an inch thick. In dry weather the plants should be gently watered, and kept clean from weeds until the following spring, when they should be planted out in rows, two feet asunder, and one foot in the rows, where they must continue two years; after that they must be removed to where they are to remain, for they will not bear transplanting large.

4. When your seedlings have stood thus till June, bestow a slight digging upon them, and scatter a little mungy half-rotten litter, fern, bean-haume, or old leaves among them, to preserve the roots from scorching, and to entertain the moisture; and then in March following

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SPRUCE FIR

In the beginning of April, having got the seeds out of the cones, which are very long, let them be sown in a North border; for when they come up, by being constantly shaded all the summer in such a situation, they will shoot much stronger, and be better to prick out the spring following in the nursery. In about six or seven weeks after sowing, the young plants will appear, when they should be screened with the usual care from the birds, which otherwise would soon destroy them. By the Autumn many of these young plants if they are kept clean from weeds and watered in dry weather, will have shot two or three inches; and in spring they should be carefully removed out of their seed-beds, taking care that the fibres be not broken off or injured. Being thus cautiously taken up, they should be as carefully planted in the nursery-ground, at the distance of one foot asunder each way. Here they may continue, with keeping them free from weeds, for two or three years, when they should be set out in the places where they are designed to remain.

SILVER FIR.

These trees are raised by sowing the seeds in a shady border, about the beginning of April. They will readily come up if the seeds are good; but as this is not often the case, they should be sown very close, otherwise we may depend on having a very thin crop. The succeeding summer the plants will require no trouble, except keeping them clean from weeds; and the spring after that, they should be pricked out in beds at about four inches distance from each other. There they may stand for two years, when they should be planted in the nursery, in rows a foot asunder every way. The year, or at farthest two years, after having been set in the nursery, they should be planted out for good; for if they are continued longer, many of them will die when planted out, and those which grow, frequently lose their leading-shoot, or meet with so great a check as to be hardly able to get into a growing state for several years.

STRAWBERRY TREE.

The Arbutus, or Strawberry Tree, is best propagated by seeds; therefore when the fruit is ripe it should be gathered, and mixed with dry sand to preserve the seeds till the time of sowing. These seeds should be sown in pots, which should be plunged into an old bed of Tanner's bark that has lost its heat, covering the bed with glasses, &c. to keep out the frost. This should be done in December, and as the spring advances, if the pots are refreshed with water, the plants will come up the beginning of April, when they should be frequently, but sparingly, watered, and constantly kept clean from weeds. As the summer advances, if the plants are shaded in the heat of the day, it will greatly promote their growth; but in warm weather they must be exposed all night to receive the dew,

(by which time it will be quite consumed, and very mellow) you shall chop it all into the earth, and mingle it together. Continue this proceſs for two or three years succeſsively, for till then the substance of the kernel will hardly be spent in the plant, which is of main import; but

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so should only be covered in the middle of the day: with this management the plants will rise to the height of five or six inches the first summer. The beginning of October, the plants may be shaken out of the pots, and their roots carefully separated, planting them singly in small pots filled with light earth; then plunge the pots into an old bed of Tanner's bark, under a common frame, observing to shade them from the sun in the middle of the day, and to give them water as they may require: in this bed the pots should remain during the winter, observing to expose the plants to the open air, at all times when the weather is favourable; but in froſty weather they must be covered, otherwise they will be in danger, if the season prove severe. The spring following, the plants may be removed to a very gentle hot-bed, which will require no other covering but mats. This will enable them to make strong shoots early in the summer, whereby they will be in a better condition to bear the cold of the succeeding winter: in this bed the plants may continue most part of the summer; for if the pots are taken out and set upon the ground, the smallneſs of their size will occaſion the earth in them to dry so fast, that watering will scarcely preserve the plants alive; but if they are kept growing all the summer, they will be more than a foot high by the next autumn: it will also be advisable to screen them from the frost during their continuance in pots, by plunging them into the ground in a warm place, and covering them with mats in bad weather. When the plants are grown to be two or three feet high, you may shake them out of the pots, and plant them in the open ground in the places where they are to remain; but this should be done in April, that they may have time to form good roots before the winter; and as all the earth about the roots may be thus preserved, there will be no fear of succeeding at this season.

HAW-THORN.

As soon as gathered, let the Haws be buried about a foot thick in a dry trench, and to prevent their heating it will be proper to mix some earth with them. Then cover them with earth of a sufficient thickneſs to keep out the wet. In this situation let them remain two winters and one summer, and early in March sow them in beds properly prepared. In the course of the summer the seeds will come up plentifully. Having stood a year in the seed-bed, let the plants be pricked out in beds of fresh earth early in the spring, at the distance of four inches from each other; and during the summer they must be kept clean, for the goodneſs of the Quick depends a great deal upon that operation. After remaining two years in those beds, the plants will be of sufficient size to plant out for hedges. Some persons recommend the Haws to be sown immediately upon being gathered, but that method is attended with many inconveniences.

BOOK I. then (and that the stature of your young imps invite) you may plant them forth, carefully taking up their roots, and cutting the stem within an inch of the ground, (if the kind, of which hereafter, suffer the knife,) set them where they are to continue: If thus you reduce them to the distance of forty feet, the intervals may be planted with Ash, which may be felled either for poles or timber, without the least prejudice to the Oak: Some repeat the cutting, we speak of, the second year, and after March (the moon decreasing) recut them at half a foot from the surface, and then meddle with them no more: But this (if the proceſs be not more severe than needs) must be done with a very sharp instrument, and with care, lest you violate and unsettle the root; which is likewise to be practised upon all those which you did not transplant, unleſs you find them very thriving trees; and then it shall suffice to prune off the branches, and

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These observations upon sowing are taken from approved Authors that have wrote for the Southern Parts of this Island, which may account for the great distances recommended in planting from the seed-bed into the nursery. Nurserymen in the Northern Counties do not allow much more than half the distance here recommended, and probably the greater coldneſs of their climate may make it neceſsary to crowd the plants closer together. Some other differences may be remarked, which, in like manner, may be accounted for from the difference of climate.

Having thus given some particular directions for forming the Seminary, and afterwards stocking it with plants, it will be required to say something concerning the Nursery into which the infant seedlings must be removed at proper seasons, in order to train them for planting out. And in fixing upon a proper piece of ground for this purpose, I recommend it to be a rich, deep, and stiffish mould, notwithstanding that the trees must afterwards be removed into a poorer soil. Reason teaches, that young trees, growing luxuriantly and freely in a good soil, will form vigorous and healthy roots, whereby they will be qualified to nourish themselves well; and when they come to be afterwards planted into worse lands, they will be enabled, from the strength of their constitution, to feed themselves freely with coarser food. On the contrary, young trees, raised upon poor land, by having their veſsels contracted, and their outward bark moſsy and diseased, will be a long time, even after being removed to a rich soil, before they attain to a vigorous and growing state: and as this is suggested by reason, experience confirms it to be true. Having fixed upon a proper place, large enough to contain the quantity of trees wanted, let it, in the first place, be well fenced, either with hedges sufficient to keep out cattle, or pales or walls to keep out rabbits or hares; for without such defence a nursery will soon be demolished. In October or November, trench the land two spits deep, and in spring turn it over again; after which let the surface be smoothed, and laid out in quarters for the reception of the different trees taken from the Seminary.

spare the tops; for this does not only greatly establish your plants, by diverting the sap to the roots, but likewise frees them from the injury and concuſsions of the winds, and makes them to produce handsome, straight shoots, infinitely preferable to such as are abandoned to nature and accident, without this discipline: By this means the Oak will become excellent timber, shooting into straight and single stems: The Chesnut, Ash, &c. multiply into poles, which you may reduce to standards at pleasure. To this I add, that as oft as you make your annual transplanting out of the nursery, by drawing forth the choicest stocks, the remainder will be improved by a due stirring and turning of the mould about their roots.

But that none be discouraged, who may, upon some accident, be desirous or forced to transplant trees, where the partial or unequal ground does not afford sufficient room or soil to make the pits equally capacious (and so apt to nourish and entertain the roots, as where are no impediments,) the worthy Mr. Brotherton, (whom we shall have occasion to mention more than once in this treatise,) speaking of the increase and improvement of roots, tells us of a large Pinaster, two feet and a half in diameter, and about sixty feet in height, the lowest boughs being thirty feet above the ground, which did spread and flourish on all sides alike, though it had no root at all towards three quarters of its situation, and but one quarter only into which it expanded its roots so far as to seventy and eighty feet from the body of the tree: the reason was, its being planted just within the square angle of the corner of a deep, thick, and strong stone-wall, which was a kind of wharfing against a river running by it, and so could have nourishment but from one quarter. And this I likewise might confirm of two Elms, planted by me about thirty-five years since; which being little bigger than walking-staves, and set on the very brink of a ditch or narrow channel, not always full of water, wharfed with a wall of a brick and half in thickneſs to keep the bank from falling in, are since grown to goodly and equally spreading trees of near two feet diameter solid timber, and of stature proportionable. The difference between these, and that of the Pine, being their having one quarter more of mould for the roots to spread in; but which is not at all discovered by the exuberance of the branches in either part.—But to return to planting where are no such obstacles.

BOOK I.

5. Theophrastus, in his third book de Causis, cap. vii. gives us great caution in planting to preserve the roots, and especially the earth adhering to the smallest fibrils, which should by no means be shaken off, as most of our gardeners do, to trim and quicken them, as they pretend, which is to cut them shorter; (though I forbid not a very small topping of the straggling threads, which may else hinder the spreading of the rest;) not at all considering that those tender hairs are the very mouths and vehicles which suck in the nutriment, and transfuse it into all the parts of the tree; and that these once perishing, the thicker and larger roots, hard and lefs spungy, signify little but to establish the stem; as I have frequently experimented in Orange-trees, whose fibres are so very obnoxious to rot, if they take in the least excefs of wet: and therefore Cato advises us to take care that we bind the mould about them, or transfer the roots in baskets, to preserve it from forsaking them; as now our nursery-men frequently do, by which they of late are able to furnish our grounds, avenues, and gardens in a moment with trees and other plants, which would else require many years to appear in such perfection. In this case the earth is already applied, and fitted to the apertures and mouths of the fibres; but it would require some time to bring them in appetite again to a new mould, by which to repair their lofs, furnish their stock, and proceed in their wonted œconomy, without manifest danger and interruption; nor lefs ought our care to be in the making and drefsing of the pits and fofses into which we design our transplantation, which should be prepared and left some time open to macerating rains, frosts, and sun, that may resolve the compacted salt, (as some will have it,) render the earth friable, mix and qualify it for aliment, and to be more easily drawn in and digested by the roots and analogous stomach of the trees: this, to some degree, may be artificially done, by burning of straw in the newly opened-pits, and drenching the mould with water, especially in over dry seasons, and by meliorating barren ground with sweet and comminuted lætations Let therefore this be received as a maxim, never to plant a fruit or forest-tree where there has lately been an old decayed one taken up, till the pit be well ventilated and furnished with fresh mould.

6. Pliny, the author of the Natural History, tells us, it was a vulgar tradition in his time, that no tree should be removed under two years old, or above three. Cato would have none transplanted lefs than five

fingers in thickneſs°; but I have showed why we are not to attend so long for such as we raise of seedlings. In the interim, if these directions appear too busy or operose, or that the plantation you intend be very ample, a more compendious method will be the confused sowing of Acorns, &c. in furrows, two feet asunder, covered at three fingers depth, and so for three years cleansed, and the first winter covered with fern without any farther culture, unleſs you transplant them: but, as I showed before in nurseries, they should be cut an inch from the ground, and then let stand till March the second year, when it shall be sufficient to disbranch them to one only shoot, whether you suffer them to stand, or remove them elsewhere. But to make an eſsay what seed is most agreeable to the soil, you may, by the thriving of a promiscuous semination, make a judgment of

Quid quæque ferat regio, et quid quæque recuset.

What each soil bears, and what it does refuse.

Transplanting those which you find least agreeing with the place, or else by copsing the starvelings in the places where they are newly sown, cause them sometimes to overtake even their untouched contemporaries.

Something may here be expected about the fittest season for this work of transplanting: of which having spoken in another treatise*, as well as in divers other places throughout this of Forest-trees, I shall need add little, after I have recommended the earliest removals, not only of all the sturdy sorts in our woods, but even of some leſs tender trees in our orchards, Pears, Apples, Vulgar Cherries, &c. whilst we favour the delicate and tender Murals, and such as are pithy, as the Walnut, and some others. But, after all, what says the plain Wood-man, speaking of Oaks, Beech, Elms, Hawthorns, and even what we call Wild and Hedge-fruit? "Set them," says he, "at All-hallon-tide, and command them to prosper; set them at Candlemas, and intreat them to grow." Nor needs it explanation. Pomona.

° Cato does not say, that no trees ought to be transplanted that are leſs than five fingers in thickneſs: His directions only regard the *manner* of transplanting trees that *are* five fingers in thickneſs.

BOOK I.

7. But here some may inquire what distances I would generally assign to transplanted trees; to this somewhat is said in the ensuing periods, and as occasion offers; though the promiscuous rising of them in forest-work, wild and natural, is to us, I acknowledge, more pleasing than all the studied accuracy in ranging of them; unless it be where they conduct and lead us to avenues, and are planted for vistas, (as the Italian term is,) in which case, the proportion of the breadth and length of the walks, &c. should govern, as well as the nature of the tree; with this only note, that such trees as are rather apt to spread than mount, as the Oak, Beech, Walnut, &c. be disposed at wider intervals than such as grow best in consort, as the Elm, Ash, Lime-tree, Sycamore, Fir, Pine, &c. Regard is likewise to be had to the quality of the soil for this work: V. G. If trees that affect cold and moist grounds be planted in hot and dry places, then set them at closer order; but trees which love dry and thirsty grounds at farther distance. The like rule may also guide in situations exposed to impetuous winds and other accidents, which may serve for general rules in this piece of tactics. In the mean time, if you plant for regular walks, or any single trees, a competent elevation of the earth in circle, and made a little hollow, like a shallow basin, for the reception of water and refreshing the roots, will be required; sticking thorns about the edges, to protect them from cattle, were not amiss. Fruit-trees, thus planted, may be set round with beans, which will produce a small crop and shade the surface, perhaps, without detriment; but this more properly belongs to the garden. Most shrubs of Ever-green, and some trees, may be planted very near one another; Myrtles, Laurel, Bays, Cypress, Yew, Ivy, Pomegranates, and others, also need little distance, and indeed whatever is proper to make hedges; but for the Oak, Elm, Walnut, Firs, and the taller timber-trees, let the dismal effects of the late hurricane, never to be forgotten! caution you never to plant them too near the mansion, or indeed any other house, that so, if such accident happen, their fall and ruin may not reach them.

8. To leave nothing omitted which may contribute to the stability of our transplanted trees, something is to be premised concerning their staking, and securing from external injuries, especially from winds and cattle; against both which, such as are planted in copses, and in ample woods, are sufficiently defended by the mounds and their closer order,

and made fast to one another by short pieces above and beneath, in which a few brambles being stuck, they will be abundantly secured, without that choaking or fretting, to which trees are obnoxious that are only single staked and bushed, as the vulgar manner is; nor is the charge of this so considerable as the great advantage, if we consider the frequent reparations which the other will require. Where cattle do not come, I find a good piece of rope tied fast about the neck of trees upon a wisp of straw to preserve it from galling, and the other end tightly strained to a hook or peg in the ground (as the shrouds in a ship are fastened to the masts) sufficiently stablishes my trees against the western blasts without more trouble; for the winds of other quarters seldom infest us: But these cords had need be well pitched to preserve them from wet, and so they will last many years. I cannot in the mean time conceal what a noble person has assured me, that in his goodly plantations of trees in Scotland, where they are continually exposed to much greater and more impetuous winds than we are usually acquainted with, he never stakes any of his trees, but upon all disasters of this kind, causes only his servants to redress and set them up again as often as they happen to be overthrown, which he has affirmed to me, thrive better than those which he has staked; and that at last they strike root so fast, as nothing but the ax is able to prostrate them: And there is good reason for this, in my opinion; for these concussions open the mould for the more ready insinuations of the roots in quest of nourishment. It is in another place I suggest, that transplanted Pines and Firs, for want of their penetrating tap-roots, are hardly consistent against these gusts after they are grown high, especially where they are set close, and in tufts, which betrays them to the greater disadvantage; and therefore such trees do best in walks, and at competent distances, where they escape tolerably well. Such therefore as we design for woods of them, should be sowed and never removed. In the mean time, many trees are also propagated by cuttings and layers; the Ever-greens about Bartholomew-tide; other trees within two or three months after, when they will have all the sap to assist them. Every body knows the way to do it is by slitting the branch a little way, and then to plunge it a foot under good mould, leaving as much of its extremity above it; and if it comply not well, to peg it down with an

CHAP. II.

BOOK I. hook or two, and so when you find it competently rooted, to cut it off beneath, and plant it forth °. Other expedients there are, by twisting the part, or baring it of the rind; and if it be out of reach of the ground, to fasten a tub or basket of earth near the branch, filled with a succulent mould, and kept as fresh as may be. For cuttings, about the same season, take such as are about the bigneſs of your thumb, setting them a foot in the earth, and near as much out. If it be of soft wood, as Willow, Poplar, Alder, &c. you may take much larger truncheons, and

° There are various ways of layering trees, by which they may be multiplied. In order to raise great quantities, a sufficient number of trees should be set, in order to be headed down for stools. The ground, previous to planting, should be double dug; and the distances the trees ought to stand from each other should vary according to the size, height, or manner they are intended to grow before they are layered. The autumn after planting, each tree should be headed to within a few inches of the ground; and the summer following it will afford you plenty of young shoots proper for layering in the autumn. Nevertheleſs, in many trees, it will be the best way to wait two years before you layer them, as each stool will afford you ten times the number of layers for the purpose; and the shoots being then many of them side-shoots, and weaker than the strong shoots from the stool the autumn before, will, for the most part, more readily strike root: for it is often observed, that in very vigorous and strong shoots, of one year's growth, after they have been layered a twelvemonth even by slit-layering, the end of the divided part has only swelled, and struck no root; whereas smaller branches on the same tree, in the same space of time, have struck good root, and commenced plants fit to be taken off and removed to the nursery. If the tree has grown from the stool two years, it must be splashed, to bring the head and branches down to the ground: all branches which croſs, crowd, or any ways incommode each other must be taken out, the ground should be hollowed, and the head of each branch brought into the hollow, pegging it down firmly with a strong peg. The ends of the young shoots must be also shortened; for one eye only, for the most part, ought to be out of the ground, if you can tell how they will fall, as it will be a safer way to do it before the slit is made than afterwards. Then the slit, or twist, or whatever method you choose, must be entered upon; and when all the branches have undergone the operation, the mould must be carefully brought in among them, filling all the interstices, and levelling the whole so that an eye of each may just appear above ground; and if any shoot has been left too long, it may now be shortened, holding it steady with the left thumb and finger, and cutting off an eye above the ground with the right. When the stool is completely layered in this manner, proceed to the next; and so on till the whole be completed. By waiting two years after the heading of the plant for the stools, ſtools which perhaps would hardly have afforded you six plants, will now yield sixty, or more, which is a sufficient encouragement for patience; nay, it is what ought to be practised by nurserymen, or gentlemen who want to raise large quantities of trees for sale, or to be

so tall as cattle may not reach them; if harder, those which are young, small, and more tender; and if such as produce a knur, or burry swelling, set that part into the ground, and be sure to make the hole so wide, and point the end of your cutting so smooth, as that, in setting, it violate and strip none of the bark; the other extreme may be slanted, and so treading the earth close, and keeping it moist, you will seldom fail of succefs. By the roots also of a thriving, lusty, and sappy tree, more may

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planted out on their own estates. And when this is the case, two quarters of sufficient size should be planted for stools, which coming in alternately, there will be an annual crop of layers for the purpose wanted. As soon as the layers are taken off, all scraggy parts should be cut off from the stools; the heads should be refreshed with the knife; and two years after, each stool will afford you a sufficient quantity of branches to be layered afresh; during which time the ground should be dug between the stools every winter; and in spring and summer the weeds should be hoed and cleared off, as often as they make their appearance. Trees of much larger growth than two or three years may be splashed, brought down, and layered in this manner; and when they are grown too large for splashing, or the nature of the wood will not bear such an operation, they may be thrown on their sides. In order to effect this, the mould must be cleared away from the roots, on the side you intend the head to be brought down; and on this side a sufficient number of the roots must be cut, that the tree may be brought to the ground, leaving proper roots to continue it in a growing state; but for this very few will be sufficient. When the tree is brought down, all the young branches are to be layered in the former manner; and the year following, after they are taken off, the tree may be set upright again, cutting off all scraggy parts, side branches that had been beat down, &c. and if you put fresh mould to the roots, it will put out as fresh as ever, and may, if you please, afterwards undergo a second operation in the like manner. If Magnolias, or large leafy Evergreens, are layered in this manner, and the place is not well defended, it will be highly proper to make a stake-hedge of good height, at a small distance; otherwise the high winds having power on their large leaves, will frequently break them off before they have taken root. Layers may be procured from trees of any size, by building scaffolding of proper height, to support tubs or pots filled with good earth, in which to layer the young branches: but this method is never practised unless on some very scarce tree, which is desired to be continued in its upright state, in as much beauty as possible. Neither, indeed, does it deserve to be adopted, unless on some such extraordinary occasions, not only on account of the expence of building the scaffolding, but of the constant trouble there will be in keeping the mould in the pots of a due moisture; for being elevated in that manner above the ground, it will dry very fast; and if it be not constantly watered, there will be little hope of your layers striking root in any reasonable time.—Layering may be performed different ways; and trees of different texture are with different degrees of difficulty made to strike root. It is chiefly the young shoots of the preceding summer that the operation should be performed

BOOK I. be propagated; to effect which, early in the spring, dig about its foot, and finding such roots as you may with a little cutting bend upwards, raise them above ground three or four inches, and they will in a short time make shoots, and be fit for transplantation; or in this work you may quite separate them from the mother roots, and cut them off. By baring likewise the bigger roots discreetly, and hacking them a little, and then covering them with fresh mould, suckers may be raised in abundance; which drawing competent roots, will soon furnish store of

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on; though all wood of a loose texture or spungy nature, if several years old, will grow very well. The different ways of layering are: 1. By only laying the shoot, whether young or old, and covering it over with fine mould. No other trouble than this slight layering is neceſsary for the increase of numbers of trees and shrubs.—2. By twisting the shoots and slightly breaking the bark, numerous trees, which would not so readily take by the former method, will emit roots from the bruised parts; and, if the work be performed in the autumn, the shoots will commence good plants by the autumn following.——3. By thrusting an awl through the joint, the young shoots of many trees will sooner emit fibres from such wounded part, than if they had been otherwise laid in the ground; and in the course of the summer months will commence good plants, fit to be taken off and planted out.—4. Cutting out some small slips of bark, about a joint, will facilitate the shoot's striking root, and cause it the sooner to commence a plant.—5. Twisting of wire round the shoot, and pricking it in each side with an awl, has been recommended: some consider the twisting as an unneceſsary trouble, when the places are pricked with the awl, as the fibres always proceed from the wounded places, and not from the parts surrounded by the wire.—6. Slit-layering, or that operation generally known among gardeners by the name of Tongue-layering, is the most universal, the best, and the safest way of layering trees and plants. It is known to every florist, who layers his carnations this way: and is practised by all gardeners for almost all sorts of trees which are not known to take by the simple method of barely laying the shoots in the ground. It is performed by cutting with the knife half way through the shoot at right angles with it, and then turning the edge of it upwards, in a perpendicular direction, along the middle of the shoot, half an inch, an inch, or more, according to the nature of the stock that is to be layered. The horizontal cut in carnation-layering, is always at a joint, and is for the most part practised by making the cut at a joint or end, where the performance is on trees. The more elegantly to perform this, make the horizontal cut half through; take out the knife and insert it below that cut, on the heel of the underwood, taking it off and drawing the edge of the knife up the middle to the above length. By taking the heel of the underwood off, the tongue or bottom of the layer will sit more at ease; and by being surrounded with mould, will be the better disposed to strike root, should the parts by any accident be made to close again. The shoot being cut in this manner, should be next pegged down into the ground, a place being hollowed for the purpose; then the point of the layer should be brought forward, pointing towards the stem of the plant, which will separate the tongue

plants, and this is practicable in Elms especially, and all such trees as are apt of themselves to put forth suckers; but of this more upon occasion hereafter. And now to prevent censure on this tedious and prolix introduction, I cannot but look on it as the basis and foundation of all the structure rising from this work and endeavour of mine; since from station, sowing, and continual culture and care, proceed all we really enjoy in the world. Every thing must have birth and beginning; and afterwards, by diligence and prudent care, formed and brought to shape and perfection. Nor is it enough to cast seeds into the ground, and leave them there, as the Ostrich[p] does her eggs in the Lybian sands,

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from the other part of the branch; and to keep it at a distance, a small chip, or such like thing, may be inserted near the top of the slit, to keep it open. The mould must now be applied; and after heading the layer down to within one eye or more of the ground, the business is done; in all layering, watering must be applied in summer to keep the ground moist, if dry weather should happen. The ground must always be kept clean from weeds; and there are few trees, if layered in this manner in the autumn, and with this management, which will not be ready for taking up the autumn following. Layering on different plants may be performed at all times of the year; though, in general, the best season for it is in the autumn: nevertheless it may be done successfully for the most part in the winter or spring; and such plants as are found not to take readily by being layered at that season, should be layered in June or July, while they are tender, and performing their summer's shoot; but as the shoots will then be soft and herbaceous, they must not be too much watered, for that will cause them to rot; therefore it will be a better method to cover the surface over the layers with moss, which will prevent the soil from drying too fast, so that a little water, now and then, will be sufficient. A large share of the vegetable creation may be multiplied by planting only their slips or cuttings in the earth, and affording them management suitable to their respective natures. Some trees grow so readily this way, that it is the only method practised to raise any desired number of plants. The Willow, the Alder, the Poplar, &c. in all their varieties, are instances of the larger kinds; whilst Sage, Rosemary, the Rue-plant, and Southernwood, are some instances of the lower ligneous plants, that are, with the utmost facility, multiplied by slips. These will grow if planted at any time of the year; but such as will not prove so obsequious to your discipline, you must indulge in the season they require to be set in; the autumn for some, the spring for others; the early part of the summer for one plant, and the latter end of it for another; all which various circumstances will be particularly described under the article of the respective trees.

[p] It is commonly reported that the female Ostrich deposits her eggs in the sand, and covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to shift for themselves. Very little, however, of this history is true; no bird has a stronger affection for her young than the Ostrich, and none watches her eggs

BOOK I. without minding them more; (because nature has deprived her of understanding;) but great diligence is to be used in governing them, not only till they spring up, but till they are arrived to some stature fit for transplantation, and to be sent abroad, after the same method that our children should be educated, and taken care of from their birth and cradle; and afterwards, whilst they are under pedagogues and discipline, for the forming of their manners and persons, that they contract no ill habits, and take such plyes as are so difficult to rectify and smooth again without the greatest industry: for prevention of this in our seminary, the like care is requisite: whilst the young imps and seedlings are yet tender and and flexible, they require not only different nourishment and protection from too much cold, heat, and other injuries, but due and skilful management in dreſsing, redreſsing, and pruning, as they grow capable of being brought into shape, and of hopeful expectation, when time has rendered them fit for the use and service required, according to their kinds. He therefore that undertakes the nursery, should be knowing not only in the choice of the seeds, where, when, and how to sow them, but also in the time of gestation they require in the womb of their mother-earth before parturition, that so he may not be surprized with her delivering some of them sooner or later than he expects; for some will lie two, nay three years, before they peep; most others one, and some a quarter, or a month

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with greater aſsiduity. It happens, indeed, in those climates, that there is leſs neceſsity for the continual incubation of the female; and she more frequently leaves her eggs, as they are in no danger of being chilled by the weather; but though she sometimes forsakes them in the day, she always careſully broods over them in the night: and Kolben, who saw great numbers of them at the Cape of Good Hope, affirms, that they sit upon their eggs like other birds, and that the male and female take this office by turns. Dr. Sparrman makes the same observation. Nor is it more true what is said of their forsaking their young after they are excluded the shell. On the contrary, the young ones are not able to walk for several days after they are hatched: during this time the old ones are very aſsiduous in supplying them with graſs, and are very careful in defending them from danger; nay, they encounter every danger in their defence. When pursued, this animal, instead of running directly forwards, and availing himself of his natural speed, takes his course in circles; while the hunters make a small course within, relieve each other, meet him at unexpected turns, and keep him thus employed for two or three days together: at last spent with famine and fatigue, and finding escape impoſsible, he endeavours to hide himself from those enemies he could not avoid, and covers his head in the sand, or the first thicket he meets. The means used by this bird to escape from its pursuers, and the manner of its death, are the only things that can, with propriety, be called *foolishneſs*.

or two, whilst the tardy and lefs forward so tire the hopes of the husbandman, that he many times digs up the plats and beds in which they were sown, despairing of a crop, at the very time they were ready to spring and come up, as I have found by experience to my lofs. Those of hard shell and integument will lie longer buried than others; for so the Libanus Cedar, and most of the coniferous trees, shed their cones late, which sometimes remain two winters and as many summers, to open their scales glued so fast together, without some external application of fire or warm water, which is yet not so natural as when they open of themselves [q]. The same may be observed of some minuter seeds, even among the Olitories, as that of Parsley, which will hardly spring in lefs than a year; so of the seed of Beet, part in the second and third month, which, upon inspecting the skins and membranes involving them, would be hard to give a reason for [r]. To accelerate this, they use imbibitions of piercing spirits, salts, emollients, &c. not only to the seeds, but to the soil, which we seldom find signify much, but rather produce abortion or monsters; and being forced to hasty birth, become nothing so hardy, healthful, and lasting as the conception and birth the plants receive from nature. These observations premised, I should now proceed to particulars, and boldly advance into the thickest of the forest, did not method seem to require something briefly to be spoken of trees in general, as they are under the name of Plants and Vegetables, especially such as we shall have occasion to discourse of in the following work: though we also take in some lefs vulgarly known and familiar, of late endenizened among us, and some of them very useful.

By trees then is meant a ligneous plant, whose property, is for the most part, to grow up and erect itself with a single stem or trunk, of a thick compacted substance and bulk, branching forth large and spreading;

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[q] The cones of the Fir tribe should be laid in the sun early in the spring, which will open their scales and permit the seeds to be shook out: the practice of opening the cones, by laying them upon the floor of a malt-kiln, is highly to be condemned. This expeditious method is often practised by seedsmen—which rationally accounts for the badnefs of the Fir-seed sometimes purchased from wholesale dealers.

[r] In this particular, Mr. Evelyn seems to have been misinformed. Parsley-seed remains in the earth about four weeks, and the seed of the Beet generally appears in about ten days after sowing.

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boughs, the whole body and external part covered and invested with a thick rind or cortex. These Terræ-filii are what we call Timber-trees, the chief subject of our following discourse.

Trees are distinguished into subordinate species. Frutices, or Shrubs, are ligneous trees, though of a lower and humbler growth, leſs spreading, and rising up in several stems, emerging from the same root, yielding plenty of suckers, which being separated, and often carrying with them some small fibre, are easily propagated and planted out for a numerous store; and this, being clad with a more tender bark, seems to differ the frutex from other arboreous kinds; since as to the shaft and stems of such as we account dwarf and pumilo, they rise often to tall and stately trees, in the more genial and benign climes[s].

Suffrutices are Shrubs lower than the former, lignescent, and more approaching to the stalky herbs Lavender, Rue, &c. but not apt to decay so soon, after they have seeded; whilst both these kinds seem also little more to differ from one another, than do trees from them; all of them consisting of the same variety of parts, according to their kinds and structure, covered with some woody, hard, membraneous or tender rind, suitable to their constitution, and to protect them from outward injuries; producing likewise buds, leaves, bloſsoms, and flowers, pregnant with fruit, and yielding saps, liquors, and juices, lachrymæ, gums, and other exſudations, though diversifying in shape and substance, taste, odour, and other qualities and operations, according to the nature of the species. To compare analogically, and describe minutely the various structure and contexture of their several veſsels and organs, whose office it is to supply the whole plant with all that is neceſsary to its being and perfection, after a stupendous, though natural proceſs, (not altogether different from creatures of animal life,) would require an anatomical lecture, which is so learnedly and accurately done to our hand by Dr. Grew, Malpighius, and other ingenious naturalists[t].

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[s] For the opinion of different authors concerning the foundation of the distinction of vegetables into herbs, trees, shrubs, and under-shrubs, see the note upon page 4.

[t] Mr. Evelyn very justly observes, that there is a great analogy between the animal and vegetable creation; and this is peculiarly discovered in the similar manner that plants and animals propagate their respective species. It is allowed on all hands that animal con-

Besides this general definition, as to what is meant by Trees, Frutexes, &c. they are specially distinguished by other characters, viz. *Leaves*, *Buds*, *Bloſsoms*, &c. but more especially by what they produce of more importance;——by their fruit ye shall know them.

The Glandiferæ, Oaks, and Ilexes, yield acorns and other useful excrescences.—The Mast-bearers are the Beech, and such as include their seeds and fruit in rougher husks, as the Chesnut-tree, &c.—The Walnut, Hasel, Avelans, &c. are the Nuciferæ.—To the Coniferæ, Resiniferæ, and Squamiferæ, belong the whole tribe of Cedars, Firs, Pines, &c.—Apples, Pears, Quinces, and several other Edulæ fruits, Peaches, Apricots, Plums, &c. are reduced to the Pomiferæ.—The Bacciferæ are such as produce Kernels, Sorbs, Cherries, viz. Holley, Bay, Laurel, Yew, Juniper, Elder, and all the Berry-bearers.—The Genistæ in general, and such as bear their seeds in cods, come under the tribe of Siliquosæ.—The Lanuginosæ are such as bed their seeds in a cottony down.

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eception is performed by the junction of the male and female; but it has remained a doubt with some, whether the union of the sexes be as eſsential in the propagation of vegetables. The great Linnæus has formed his noble system of Botany upon the certainty that all plants have male and female organs, either growing upon the same tree, or upon different trees of the same species: his method is distinguished by the name of the Sexual System, and is now universally acknowledged. On its first appearance, it was received with all that caution that becomes an enlightened age; and Nature was traced experimentally through all her variations before it was universally aſsented to. Tournefort refused to give it a place in his system; and Pontedera, though he had carefully examined it, treated it as chimerical. The learned Dr. Alston, Profeſsor of Botany in the University of Edinburgh, violently opposed it; but the proofs which Dr. Linnæus has given amongst the aphorisms of his Fundamenta Botanica, and farther illustrated and explained in his Philosophia Botanica, are so clear, that the mind does not hesitate a moment in pronouncing animal and vegetable conception to be the same: there is, however, this difference; in animals fruition is voluntary, but in vegetables neceſsary and mechanical. Another and more striking proof of the analogy between plants and animals may be drawn from observations made in their infant states, at which early period they seem nourished and protected in a similar manner. For this the curious reader is requested to consult the note upon page 27, in which he will find sufficient proofs to convince him, that every blade of graſs which he contemptuously treads upon, has been nurtured in its infancy by the hand of Providence, with as much care, and in the same manner, as Man himself with all his pre-eminence of station.

The Ash, Elm, Tilia, Poplar, Hornbeam, Willow, Salices, &c. are distinguished by their Keys, Tongues, Samera, Pericarpia, and Theca, small, flat, and husky skins including the seeds as in so many foliols, bags, and purses, fine membraneous cases, Catkins, Palms, Juluses, &c. needleſs to be farther mentioned here, being so particularly described in the chapters following, as are also the various Ever-greens and Exotics.

The Oak Tree.

Published June 1st 1792 by J. Stratford 112 Strand according to the Act directs.

J. Miller del. & Sculpt.

CHAPTER III.

THE OAK[a]

1. ROBUR, the Oak. I have sometimes considered it very seriously, what should move Pliny to make a whole chapter of one only line, which is leſs than the argument alone of most of the rest in his huge volume; but the weightineſs of the matter does worthily excuse him, who is not wont to spare his words or his reader. *Glandiferi maximè generis omnes quibus honos apud Romanos perpetuus.* "Mast-bearing trees were princi- CHAP. III.

[a] The OAK, the pride and glory of the forest, demands our first attention, whether we conſider the dignity of its station, or the variety of uses to which it is applied. Being a native of our island, it adapts itself in a wonderful manner to almost every soil; and, if well defended in its infancy, there are few places in which it will not grow to a national advantage. The Oak naturally delights in a rich, deep, and loamy soil; but lands of that quality are now more profitably employed in pasture and tillage. However, there are large portions of land in this kingdom which yield but a small profit to the owners. Such wastes, if situated near rivers, or navigable canals, are nobly calculated for raising Oaks, which, at some distant period, may launch themselves into the Ocean, Guardians of Liberty and Commerce. Of the Oak there are fourteen species, of which number nine are deciduous and five evergreen.

1. QUERCUS *(ROBUR)* foliis deciduis oblongis superné latioribus, sinubus acutioribus: angulis obtusis. Lin. Sp. Plant. 1414. *Oak with oblong deciduous leaves, broader toward the top, having acute indentures, with obtuse angles.* THE COMMON OAK.

This is the common English Oak, which, for ship-building and other œconomical uses, far excels all the kinds in the known world. The following is a variety, but Mr. Miller conſiders it as a distinct species under the title of

QUERCUS *(FŒMINA)* foliis deciduis oblongis obtusis, pinnato-sinuatis petiolis breviſsimis, pedunculis glandorum longiſsimis. *Oak with oblong, obtuse, deciduous leaves, which are winged, sinuated, and have very short foot-stalks, with the fruit growing upon long foot-stalks.* THE FEMALE OAK.

Mr. Miller observes that this sort is not so common as the first, and he informs us, that in the Wilds of Kent and Sussex there may be seen many large trees of this kind. According to him, the leaves are not so deeply sinuated as those of the common Oak, nor are they so irregular, the indentures being opposite, like the lobes of winged leaves; these have scarce any foot-stalks, but sit close to the branches; the acorns stand upon very long foot-stalks. The timber of this kind is accounted, by some, better than that of the first, and the trees, when growing, have a more lofty appearance.

BOOK I. pally those which the Romans held in chiefest repute." Lib. xvi. cap. iii.—And in the following, where he treats of Chaplets, and the dignity of the Civic Crown, he says it might be composed of the leaves or branches of any Oak, provided it were a bearing tree, and had acorns upon it. It is then for the esteem which these wise and glorious people had of this tree above all others, that I will first begin with the Oak; and

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2. QUERCUS *(CERRIS)* foliis oblongis lyrato-pinnatifidis, laciniis transversis acutis, subtus subtomentosis. Lin. Sp. Plant. 1415. *Oak with oblong leaves which are lyre-shaped, wing-pointed, and have transverse acute jags, which are downy on their under side.* Quercus calyce hispido, glande minore. C. B. P. 420. *Oak with a prickly cup and smaller acorn.*—*SMALLER PRICKLY-CUPPED SPANISH OAK.*

This grows naturally in Spain. The leaves are oblong and pointed, and frequently indented in the middle like a lyre; they are jagged and acute-pointed, a little hoary on their under side, and stand upon slender foot-stalks. The acorns are small, and have rough prickly cups.

3. QUERCUS *(ESCULUS)* foliis pinnato-sinuatis lævibus, fructibus sessilibus. Lin. Sp. Plant. 1414. *Oak with smooth wing-indented leaves, and fruit sitting close to the branches.* Quercus parva sive Phagus Græcorum et Esculus Plinii. C. B. P. *The small Oak or Phagus of the Greeks, and the Esculus of Pliny.* *THE CUT-LEAVED ITALIAN OAK.*

This sort grows naturally in Spain and Italy; the leaves are smooth, and deeply sinuated like winged leaves; some of the sinuses are obtuse, and others end in acute points; they have very short foot-stalks; the branches are covered with a purplish bark when young; the acorns are long and slender, the cups rough and a little prickly, sitting close to the branches The acorns are sweet, and are frequently eaten by the poor in the south of France, who, in times of scarcity, grind them and make bread with the flour. Of this species of Oak the Romans made their Civic Crowns. "Civica iligna primo fuit, postea magis placuit ex Esculo Jovi sacra." PLIN.

4. QUERCUS *(ÆGILOPS)* foliis ovato-oblongis, glabris, serrato dentatis. Lin. Sp. Plant. 1414. *Oak with oblong, oval, smooth, sawed, indented leaves.* Quercus calyce echinato, glande majore. C. B. P. 420. *Oak with a prickly cup and larger acorn.* *THE LARGE PRICKLY-CUPPED SPANISH OAK.*

This species grows naturally in Spain. The trunk rises nearly as high as the common Oak; the branches extend very wide on every side, and are covered with a greyish bark, intermixed with brown spots; the branches are closely garnished with oblong oval leaves, about three inches long, and almost two broad, which are deeply sawed on their edges; most of the saws or teeth turn backward, and terminate in acute points. The leaves are stiff, of a pale green on their upper side, and downy on their under; the acorns have very large scaly cups which almost cover them; the scales are ligneous and acute pointed, standing out a quarter of an inch; some of the cups are as large as middling apples.

5. QUERCUS *(RUBRA)* foliis obtuse sinuatis setacco-mucronatis. Lin. Sp. Plant. 1413. *Oak with obtuse sinuated leaves, terminated by bristly points.* Quercus Esculi divisura, foliis

indeed it carries it from all other timber whatsoever, for building of ships in general, and in particular being tough, bending well, strong, and not too heavy, nor easily admitting water. CHAP. III.

'Tis pity that the several kinds of Oak are so rarely known amongst us, that wherever they meet with Quercus, they take it promiscuously for

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amplioribus aculeatis. Pluk. Alm. 309. tab. 54. fig. 4. *Oak with broad spiny leaves, which are divided like the Esculus.* THE RED OAK.

This sort grows naturally in Virginia, and in other parts of North America. It arrives at a large size in the countries where it naturally grows; the bark is smooth, and of a greyish colour, but that on the younger branches is darker; the leaves are six inches long, and two and a half broad in the middle; they are obtusely sinuated, each sinus ending with a bristly point, of a bright green, standing upon short foot-stalks. The leaves continue their verdure very late in autumn, so that unleſs hard frost comes on early, they do not fall till near Christmas, before which time they change their colour and become red. The acorns of this sort are a little longer, but not so thick as those of the common Oak.

6. QUERCUS *(PRINUS)* foliis obovatis utrinque acuminatis sinuato-serratis, denticulis rotundatis uniformibus. Lin. Sp. Plant. 1413. *Oak with oblong oval leaves, which are pointed on both sides, and have saved sinuses, with uniform roundish indentures.* Quercus castaneæ foliis procera arbor Virginiana. Pluk. Alm. 309. THE CHESNUT-LEAVED OAK.

This grows naturally in North-America, of which there seems to be two kinds; one grows to a much larger size than the other, though this may be occasioned by the soil in which they grow. The largest sort grows in the rich low lands, where it becomes the largest tree of any of the Oaks in those countries: the wood is not of a fine grain, but is very serviceable; the bark is grey and scaly; the leaves are five or six inches long, and two inches and a half broad in the middle, indented on the edges, and have many transverse veins running from the midrib to the borders; they are of a bright green, and so nearly resemble the leaves of the Chesnut-tree, as scarcely to be distinguished from them. The acorns of this sort are very large, and have short cups. The leaves of the other are not so large, nor so strongly veined, and the acorns are smaller and a little longer, which may arise from the soil.

7. QUERCUS *(NIGRA)* foliis cuneiformibus obsolete trilobis. Lin. Sp. Plant. 1413.—*Oak with wedge-shaped leaves, having three worn-out lobes.* Quercus folio non serrato in summitate quasi triangulo. Catesb. Car. 1. p. 20. THE BLACK OAK.

This grows naturally on poor land in most parts of North America, where it never comes to a large size; the wood is of little value. The bark is of a dark brown colour; the leaves are very broad at the top, where they have two waved indentures, which divide them almost into three lobes; they diminish gradually to their base, where they are narrow; they are smooth, of a lucid green, and have short foot-stalks. The acorns are smaller than those of the common Oak, and have short cups. Of this species we have a variety or two, one particularly with trifid leaves, and another slightly trilobate, called the *Black Oak of the Plains.*

BOOK I. our common Oak; whereas there be many species of that goodly tree, though we shall take notice only of the two which are frequent with us. These are, the Quercus Urbana, which grows more upright, and, being clean and lighter, is fittest for timber; and the Robur, or Quercus Silvestris, (taking Robur for the general name, if at least contra-distinct from the rest,) which, as the name imports, is of a vast robust and in-

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8. QUERCUS *(ALBA)* foliis obliquè pinnatifidis, sinubus angulisque obtusis. Lin. Sp. Plant. 1414. *Oak with oblique many-pointed leaves, having obtuse sinuses and angles.* Quercus alba Virginiana. Catesb. Car. 1. p. 21. tab. 21. *THE WHITE OAK.*

This sort grows naturally in North America, where the wood is esteemed preferable to any of their other sorts for building, being much more durable. The bark of this tree is greyish, the leaves are of a light green, six or seven inches long, and four broad in the middle; they are regularly indented almost to the midrib. The indentures are obtuse. The leaves have short-foot stalks. The acorns greatly resemble those of the common Oak.

9. QUERCUS *(PHELLOS)* foliis lanceolatis integerrimis glabris. Lin. Sp. Plant. 1412. *Oak with spear-shaped, entire smooth leaves.* Quercus sive Ilex Marilandica, folio longo angusto Salicis. Catesb. Car. 1. p. 17. *THE WILLOW-LEAVED OAK.*

This species is a large timber tree, and a native of North America. The leaves are long and narrow, resembling those of our common Willow. Hence its name. Of this sort there are several varieties, which are all included under the appellation of Willow-leaved Oaks.

10. QUERCUS *(ILEX)* foliis ovato-oblongis indivisis serratisque petiolatis subtus incanis, cortice integro. Lin. Sp. Plant. 1412. Ilex oblongo serrato folio. C. B. P. 424. Ilex arborea. Bauh. hist. *THE ILEX, OR EVER-GREEN OAK.*

This species is generally known by the title of Ilex, or Ever-green Oak; of which there are several varieties, differing greatly in the size and shape of their leaves; but they all arise from acorns of the same tree, as Mr. Miller observes; nay, the lower and upper branches of the same tree are frequently garnished with leaves, very different in size and shape from each other; those on the lower branches being much broader, rounder, and their edges indented and set with prickles, but those on the upper are long, narrow, and entire. The leaves of this tree are from three to four inches long, and one broad near the base, gradually lefsening to a point; they are of a lucid green on their upper side, but whitish and downy on their under, and are entire, standing upon pretty long foot-stalks; these remain green all the year, and do not fall till they are thrust off by the young leaves in the spring. The acorns are smaller than those of the common Oak, but of the same shape.

11. QUERCUS *(GRAMUNTIA)* foliis oblongo-ovatis sinuato-spinosis sefsilibus subtus tomentosis, glandibus pedunculatis. Lin. Sp. Plant. 1412. *Ever-green Oak with oblong, oval, prickly, indented leaves, which are woolly on their under side, and bear acorns with foot-stalks.*—

flexible nature, of an hard black grain, bearing a smaller acorn, and affecting to spread in branches, and to put forth his roots more above ground; and therefore, in the planting to be allowed a greater distance, viz. from twenty-five to forty feet, nay sometimes as many yards, whereas the other shooting up more erect, will be contented with fifteen. This kind is farther to be distinguished by its fulnefs of leaves, which tarnish,

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Ilex foliis rotundioribus et spinosis, e luco Gramuntio. Bot. Monsp. 140. *THE HOLLY-LEAVED EVER-GREEN OAK.*

Linnæus has made this tree a distinct species, but Mr. Miller seems to think it only a variety of the former. The leaves are prickly and shaped like the Holly. Hence its name. It grows naturally about Montpelier.

12. QUERCUS *(coccifera)* foliis ovatis indivisis, spinoso dentatis glabris. Lin. Sp. Plant. 1413. *Oak with oval, undivided, smooth leaves, which are prickly and indented.* Ilex aculeata, cocciglandifera. C. B. P. 425. *THE KERMES OAK.*

This kind of Oak grows plentifully in Spain, Provence, Languedoc, and along the Mediterranean coast. It is a tree of small growth, seldom rising above twelve feet. The leaves are oval and undivided; they are smooth on their surface, but indented on their edges, which are armed with prickles like those of the Holly. It is feathered to the bottom, which gives it the appearance of a bushy Shrub. The acorns are smaller than those of the common Oak. From this tree are gathered the Kermes, with which the antients used to die their garments of that beautiful colour called Coccineus, or Cocceus, being different from the Purpura of the Phœnicians obtained from the testaceous fish called Murex. In course of time the Murex became neglected, and the Kermes, we are now speaking of, was introduced. This supported its reputation till the discovery of America, when it gave place to the Cochineal, an insect found in the Mexican woods upon a plant named by Linnæus, Cactus Cochinillifer.

Both antients and moderns seem to have had confused notions concerning the origin and nature of the Kermes; some considering it as a fruit, without a just knowledge of the tree which produced it; others taking it for an excrescence formed by the puncture of a particular fly, the same as the common gall produced upon the Oak. Tournefort was of this number.—Count Marsigli, and Dr. Nisole, a physician of Mountpelier, made experiments and observations, with a view to further discoveries, but did not perfectly succeed. Two other physicians at Aix in Provence, Dr. Emeric and Dr. Garidel, applied themselves about the same time, and with greater succefs, having finally discovered that the Kermes is the body of an insect, after having undergone several transformations. The progrefs of these transformations must be considered at three different seasons. In the first stage, about the beginning of March, an animalcule, no larger than a grain of millet, is perceived sticking to the branches of the tree, where it fixes itself, and soon becomes immoveable; at this period it grows the most, and swells with the sustenance that it draws in: this state of rest seems to have deceived the curious observer, it then resembling an excrescence of the bark; during this period of its growth, it appears to be covered with a down, extending over its whole body like a net, and adhering to the bark; its figure is convex, not unlike a very small Sloe; in

BOOK I. and becoming yellow at the fall, do commonly clothe it all the winter, the roots growing very deep and straggling. The author of Britannia Baconica speaks of an Oak in Lanhadron-Park in Cornwall, which bears constantly leaves speckled with white, and of another called the Painted Oak: others have since been found at Fridwood, near Sittingbourn in Kent; as also Sycamores and Elms in other places, mentioned by the

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such parts as are not quite hid by this soft garment, many bright specks are perceived of a golden colour, as well as stripes running acrofs the body from one place to another. At the second stage, in April, its growth is completed, when it becomes round resembling a pea in shape. It has then acquired more strength, and its down is changed into dust, and seems to be nothing but a husk or a capsule, full of a reddish juice, not unlike discoloured blood. Its third state is towards the end of May, a little sooner or later according to the warmth of the climate. The husk appears full of small eggs, lefs than the seeds of a poppy. They are properly ranged under the belly of the insect progrefsively placed in the nest of down that covers its body, which it withdraws in proportion to the number of eggs: after this work is performed, it soon dies, though it still adheres to its position, rendering a further service to its progeny, and shielding them from the inclemency of the weather, or the hostile attacks of an enemy. In a good season they multiply exceedingly, having from 1800 to 2000 eggs, which produce the same number of animalcules. When observed by the microscope in July or August, that which appeared as dust, are so many eggs or open capsules, as white as snow, out of which ifsues a gold coloured animalcule, of the shape of a cockroach, with two horns, six feet, and a forked tail. In Languedoc and Provence the poor are employed to gather the Kermes, the women letting their nails grow for that purpose, in order to pick them off with greater facility. The custom of lopping off the boughs is very injudicious, as by that means the next year's harvest is destroyed. Some women will gather two or three pounds a day; the great point being to know where they are most likely to be found in any quantity, and to gather them early with the morning dew, as the leaves are more pliable and tender at that time than after they have been dried and parched by the rays of the sun. Strong dews will make them fall from the trees sooner than usual. When the proper season pafses, they fall off of themselves, and become food for birds, particularly pigeons. Sometimes there will be a second production, which is commonly of a lefs size with a fainter tinge. The first is generally found adhering to the bark, as well as on the branches and stalks; the second is principally on the leaves, as the worms choose that part where the nutritious juice preserves itself the longest, is most abundant, and can be most easily devoured in the short time that remains of their existence, the bark being then drier and harder than the leaves.

Those who buy the Kermes to send to foreign parts, spread it on linen, taking care to sprinkle it with vinegar, to kill the worms that are within, which produces a red dust, which in Spain is separated from the husk. Then they let it dry, pafsing it through a searce, and make it up into bags. In the middle of each, its proportion of red dust is put into a little leather bag, and belongs to the buyer; it is then ready for transportation, being always in demand on the African coast. The people of Hinojos, Bonares, Villalba, and other parts of the kingdom of Seville, dry it on mats in the sun, stirring it about, and separating the red dust.

learned Dr. Plot in his Natural History of Oxfordshire; which I only mention here, that the variety may be compared by some ingenious person thereabouts, as well as the truth of the fatal præ-admonition of Oaks bearing strange leaves: besides, we may note that famous Oak of New-Forest in Hampshire, which puts forth its buds about Christmas, but withers again before night; and which was ordered (by our late King

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This is the finest part, and being mixed with vinegar goes by the name of Pastel. The same is done with the husks; but these are but of half the value of the dust. The Kermes of Spain is preferred on the coast of Barbary, on account of its superior goodneſs. The people of Tunis mix it with that of Tetuan, for dying these scarlet caps so much used in the Levant. The Tunesians export every year above 150,000 dozen of these caps, which yields to the Dey a revenue of 150,000 hard dollars (33,750l.) per annum for duties; so that, exclusive of the uses of the Kermes in medicine, it appears to be a very valuable branch of commerce.—In some years it has produced 30000 dollars (5000 l.) to the inhabitants of Xixona in Spain. The first who has spoken of these insects with any accuracy is Peter Quiqueran, Bishop of Senez, in his book de Laudibus Provinciæ, 1550.

13. QUERCUS *(SUBER)* foliis ovato-oblongis indivisis serratis subtus tomentosis, cortice rimoso fungoso. Lin. Sp. Plant. 1413. *Oak with oval, oblong, undivided leaves, sawed and woolly on their under side, and a fungous cleft bark.* Suber latifolium perpetuo virens.—C. B. P. 424. *THE CORK-TREE.*

The leaves of this useful species are entire, of an oblong oval, about two inches long, and one and a quarter broad, sawed on their edges, and have a little down on their under sides; their foot-stalks are very short; the leaves continue green through the winter 'till the middle of May, when they generally fall off just before the new leaves come out, so that the trees are very often almost bare for a short time. The acorns are very like those of the common Oak. The exterior bark of this tree is the cork, which is taken off from the trees every eight or ten years; but there is an interior bark which nourishes the trees, so that the stripping off the outer is so far from injuring them, that it rather prolongs their life; for those whose bark are not taken off, seldom last longer than fifty or sixty years in health; whereas the trees which are barked every eight or ten years, will live a hundred and fifty years and more. The bark of the young tree is porous and good for little; however it is neceſsary to take it off when the trees are twelve or fifteen years old, without which the bark will not be good, and after eight or ten years the bark will be fit to take off again; this second peeling is of little use, but at the third peeling the bark is in perfection, and will continue so many years, the best cork being taken from the old trees. The month of July is the time for stripping off this bark, when the sap flows plentifully; this operation is performed with an instrument similar to that for disbarking Oak. Of this species there is a variety called the Narrow-leaved Cork Tree.

14. QUERCUS *(VIRGINIANA)* foliis lanceolato-ovatis integerrimis petiolatis semperviren-tibus. *Oak with spear-shaped, oval, entire leaves, which are Ever-green, and have foot-stalks.*—

BOOK I. Charles the Second) to be inclosed with a pale, as I find it mentioned in the last edition of Mr. Camden's Britannia: also another before this, which his grandfather, King James, went to visit, and caused benches to be placed about it; which giving it reputation, the people never left hacking of the boughs and bark till they killed the tree; as I am told they have served that famous Oak near White-Lady's, which hid and

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Quercus sempervirens foliis oblongis non sinuatis. Banist.. *Ever-green Oak, with oblong leaves which are not finuated.* THE LIVE OAK.

This species grows naturally in Carolina and Virginia, where it rises to the height of forty feet. The grain of the wood is hard, tough, and coarse; the bark is of a grey colour. The leaves are oval and spear-shaped, about three inches long, and one and a half broad, entire, and of a dark green, standing upon short foot-stalks. They are of a thick consistence, and continue green all the year. The acorns are oblong and small, and are eaten by the Indians, who lay them up in store for the winter. They also draw from them an oil which is very good.

Besides these fourteen species of Oaks, enumerated by Botanists, there is another described under the name of the Lucombe, or Devonshire Oak. Of this new kind there is a particular account given in the 62d volume of the Philosophical Transactions, in a letter from Mr. Holwell to Mr. Campbell. The following extract contains all that we yet know of this most surprising species:

"About seven years past, Mr. Lucombe sowed a parcel of acorns, saved from a tree of
" his own growth, of the iron or wainscot species; when they came up, he observed one
" amongst them that kept its leaves throughout the winter. Struck with the phænomenon
" he cherished and paid particular attention to it, and propagated, by grafting, some thou-
" sands from it, which I had the pleasure of seeing, eight days ago, in high flourishing
" beauty and verdure, notwithstanding the severity of the winter. Its growth is straight
" and handsome as a fir, its leaves ever-green, and the wood is thought, by the best judges,
" in hardneſs and strength, to exceed all other Oak. It makes but one shoot in the year,
" viz. in May, and continues growing without interruption: whereas other Oaks shoot
" twice, viz. in May and August; but the peculiar and inestimable part of its character is,
" the amazing quickneſs of its growth, which I imagine may be attributed (in some degree
" at least) to its making but one shoot in the year; for I believe all trees that shoot twice
" are for some time at a stand before they make the second. I had the curiosity to take
" the dimensions of the parent tree, (seven years old,) and some of the grafts; the first
" measured 21 feet high, and full 20 inches in the girt; a graft of four years old, 16 feet
" high, and full 14 inches in the girt; the first he grafted is six years old, and has outshot
" its parent two feet in height. The parent tree seems to promise his acorns soon, as he
" bloſsoms, and forms his foot-stalk strong, and the cup upon the foot-stalk with the appear-
" ance of the acorn, which, with a little more age, will swell to perfection. This Oak is
" distinguished, in this country, by the title of the Lucombe Oak; his shoots in general

protected our late Monarch from being discovered and taken by the rebel soldiers who were sent to find him, after his almost miraculous escape at the battle of Worcester. In the mean time, as to this extraordinary precosenefs, the like is reported of a certain Walnut-tree, as well as of the famous White-thorn of Glastonbury, and Black-thorns in several places. Some of our common Oaks bear the leaves green all winter; but they

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" are from four to five feet every year, so that he will, in the space of thirty or forty years, " outgrow in altitude and girt the common Oak at an hundred. In two or three days I will " forward to you, in a parcel, a branch which I cut off from the original tree, and another " from the graft of four years old, also a dead branch of the Iron or Wainscot Oak, just to " show that, from the similarity of the leaves, it is a descendant from that species, although " differing from it in every other particular. I send you also, by the Exeter stage, a spe- " cimen of the wood. I have a walking pole full five feet long, a side-shoot from one of " the grafts, only one year and a half old. Several Gentlemen round this neighbourhood, " and in the adjoining counties of Cornwall and Somerset, have planted them, and they are " found to flourish in all soils." I am, &c.

Exeter, Feb. 24, 1772.

The Oak, in the Linnæan system, is ranked in the clafs and order *Monoecia Polyandria*, which comprehends such plants as have male and female flowers on the same plant; the male flowers having numerous stamina.

The common Oak flowers in the spring, though there is no exact time for the opening of the flowers or leaves; these circumstances depend on the backwardnefs or forwardnefs of the season, or the difference of the situation or soil on which the trees stand. We often observe one Oak in full leaf, and at the same time another, standing near it, without any such appearance, owing to the coldnefs or poverty of the stratum on which it stands, and which would have been unperceived, had not the tree shown it. But notwithstanding this, observation and experience teach us, that these differences are very inconsiderable, and that the Oak which is most backward in putting forth its leaves, generally retains its verdure the longest in the autumn. In general, the flowers, which are of a yellowish hue, begin to open about the 7th of April; about the 18th the leaves appear, at which time the flowers are in full bloom; and about the 6th of May the leaves will be quite out, and remain until the autumnal frosts come on.

Oaks are generally raised in vast quantities together, called Woods, where they thrive best, and arrive to a greater height than in hedge-rows. We seldom see a good Oak in a hedge-row: they generally throw out large lateral branches, and form a spreading and beautiful head, but the trunk is for the most part very short; whereas in woods they draw one another up, and thus sociably aspire to such a height, as to be sufficient to answer any purposes in use.

Various are the opinions of mankind about the raising an Oak wood. Some think the plants should never be removed, but remain where the acorn was first sown; others, again,

BOOK I. are generally Pollards, and such as are sheltered in warm corners and hedge-rows. To speak then *particularly* of Oaks, and *generally* of all other trees of the same kind, by some infallible characters, notice should be taken of the manner of their spreading, stature and growth, shape and size of the Acorn, whether single or in clusters, the length or shortneſs of the stalks, roundneſs of the cup, breadth, narrowneſs, shape and in-

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believe that a wood should be raised by plants taken from a nursery. As each of these methods has its advantages, I shall therefore endeavour to show the best mode of proceeding in raising an Oak wood both ways, that every one may choose that which he likes the best.

And, first, to raise a wood from acorns sown in the *Seminary*.

Let a proper spot in the seminary be prepared against the time the seeds are ripe. The soil should be loamy, fresh, and in good heart; and should be prepared by digging it well, breaking all clods, and clearing it of weeds, roots, large stones, &c. The acorns should be gathered from the straightest, most thriving, and beautiful trees; and if they remain until they fall off of themselves, they will succeed the better.

Having a sufficient quantity of well-ripened acorns for your purpose, proceed to prepare your beds in the ground that is just got ready for their reception. Mark out the beds with a line, four feet broad, and let there be an alley between each bed two feet wide; rake the earth out of the bed into the spaces designed for the alley, until the bed be sunk about two inches deep; then sow your acorns in the bed, about three inches asunder, and gently preſs them down with the spade, or, if more agreeable, they may be set in rows, the lines for that purpose being marked out with a sharp-pointed stick. Throw the earth, that has been raked into the alleys, over the acorns, and, after having dreſsed up the bed, and gently preſsed it down with the back of the spade, proceed to the next bed, and so on until the whole be finished. This work is best performed in February, though some prefer the autumnal months.

In about six weeks the plants will appear above ground; and in these beds they may remain two years, without any further trouble or care, than keeping them clean from weeds, and now and then refreshing them with water in very dry seasons. When the trees are two years old, they will be of a proper size for planting out.

Let us now see in what manner we are to prepare the ground for their reception. The best way is by trenching, or double digging, as deep as the soil will admit of: but as this is a very expensive proceeding, and consequently can only be practised upon a small scale, I shall recommend another good method of preparing the ground. This is to be done by proper ploughing; and, if agreeable, the year before the land is planted, it may bear a crop of oats, rape, or turnips. By this means the sward will be effectually destroyed. After the crop is off, let the ground be trench-ploughed, and then harrowed with heavy harrows to break the clods: about the end of October let it be again ploughed croſs ways, and harrowed as before. This is the season for planting the sets; for the ground

dentures of the leaf; and so of the bark, asperous or smooth, brown or bright, &c. Though most, if not all of them, may rather be imputed to the genius and nature of the soil, situation or goodneſs of the seed, than either to the pretended sex or species. And these observations may serve to discover many accidental varieties in other trees, without nicer distinctions, such as are fetched from profeſsed botanists, who make it not so much their study to plant and propagate trees, as to skill in their

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by being thus croſs-ploughed and well harrowed, will be in proper order for their reception. The manner of planting the sets is as follows:

First, carefully take the plants out of the seed-bed, shorten the tap-root, and take off part of the side-shoots, that there may be an equal proportion of strength between the stem and the root. If the wood is designed to be but small, ten, twenty, or thirty acres, then lines may be drawn, and the trees planted in rows, four feet distant from each other, and the trees two feet asunder in the row: each line must have a man and a boy for planting. The ground being made light and pliable by croſs-ploughing and harrowing, the man strikes his spade into the earth close to the line; he then takes it out and gives another stroke at right angles with it; then the boy, having a parcel of plants under his left arm, takes one with his right hand, and readily puts it into the crevice made by the spade at the second stroke: after this the man gently preſses the mould to it with his foot, and thus the young Oakling is planted. He proceeds in the same manner to the next, and so on 'till all is finished. An active man will, with his boy, plant 1500 or 2000 in a day; and while they are planting, others should be employed in taking up fresh sets from the seed-bed, sorting them and preparing their roots. In short, a sufficient number of hands should be set to every part of this work, that the whole may be carried on with dispatch; for the ground cannot be too soon furnished with its plants, after it is in readineſs to receive them; neither can the plants be put too early into the ground, after they are taken up from the seminary. Those plants which are nearly of the same size should be made to occupy a large quarter together, and the weakest should be left in the seminary a year longer to gain strength.

The trees, either for small or large plantations, being in the ground, the first care should be to fence them well from cattle, and even, if poſsible, from rabbits and hares. The next should be, to keep them clear from weeds, that they may not be incommoded in their growth. In all lands, weeds must be carefully watched, and destroyed at their first appearance. In small plantations hoeing may do; but where the plantations are large and noble, a double-shelving plough should be provided; and when the weeds are got two or three inches high, this must be drawn exactly down the middle of each row by horses with their mouths muzzled, somebody leading the foremost horse: this plough will effectually throw a ridge each way, so that the edge of it will be almost contiguous to the plants on both sides. This being done, the whole surface of the ground will be changed, and the weeds all buried, except a few about the stems of the plants, which a man following the plough should cut or pluck up. In this manner the ground may lie until a fresh crop of weeds present themselves; when these are about three inches high, a common plough should be

BOOK I. medicinal virtues, and other uses; always excepting our learned countryman Mr. Ray, whose incomparable work omits nothing useful or desirable on this subject, wanting only the accomplishments of well-designed sculps,

3. I shall not need to repeat what has already been said, Chap. ii. con-

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provided to go up one side of the row and down the other, to plough the ridges made by the double-shelving plough, into their former places; men following with hoes to destroy such weeds as are near the stems of the trees. Thus will the whole scene be changed again; the ground will appear as new tilled; and in this condition it may remain until the weeds call for the double-shelving plough a second time, which must also be followed alternately with the common plough as occasion may require. By this means the ground will not only be kept clean of weeds, but the earth, by constant stirring, will be more replete with nourishing juices, the gentle showers will produce their good effects, the sun will have his influence, and all the powers of vegetation will combine to nourish and set forward the infant Oak. This work must be repeated every year, until the Oaks are of a height sufficient to destroy the weeds, which may be, perhaps, in three or four years, according to the goodneſs of the ground in which they are planted.

When it is thought advisable to raise an Oak wood from the acorn, let the following directions be observed.

Having the ground prepared, as before directed, for the reception of the young Oak plants, and having a sufficient quantity of acorns, all gathered from the most vigorous, healthy, and thriving trees, proceed to their setting in the following manner: In the months of February and March, let lines be drawn acroſs the ground for the rows, at the distance of four feet from each other; but if this be thought too great an interval, the rows may be made at three feet, in which case the acorns must be put down at a greater distance from each other. Then having sticks properly rounded to make the holes, plant the acorns by the side of the lines, at the distance of ten inches asunder: let them be put down about two inches below the surface, and see that the earth be properly closed by the planting stick, to prevent the mice, or crows, from injuring the seed. In some places it is customary to sow the acorns after the plough; but where the ground happens to be stiff, great care should be taken not to cover the seed with too thick a furrow. As in this manner of sowing, the plants will come up very irregular, the mode of thinning must be left to the discretion of the planter.

The first year after planting the acorns, the weeds must be kept down by hoeing and hand-weeding; and this must be done early in the spring before the weeds get so strong as to hide the tender plants, which would occasion many of them to be destroyed in cleaning. It is also the cheapest, as well as the neatest husbandry, to take weeds down before they grow too large; for though the ground may require an additional hoeing in the spring, yet the weeds being hoed down when young, a man may hoe over a great quantity of ground in a day: weeds cut in their tender state immediately die; whereas when

cerning the raising of this tree from the Acorn: it will also endure the laying, but never to advantage of bulk or stature It is in the mean time the propagation of these large spreading Oaks, which is especially recommended for the excellency of the timber, and that his Majesty's forests were well and plentifully stored with them, because they require room and space to amplify and expand themselves, and should therefore

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they are suffered to grow old and strong, they frequently grow again, especially if rain falls soon after, perfect their seed in a short time, and thereby poison the soil of the whole plantation.

The second year of their growth, in extensive plantations, the double-shelving and common plough may be made use of, as before directed, to cultivate and keep the ground clean; and this culture should be attended to until the plants are become so large that it will not be in the power of the weeds to injure them. As plantations of Oaks from the acorn are rather precarious, it will be right to form a small seminary in the same field, to repair the intervals that may have miscarried. And here it may be necefsary to observe, that this seminary should be taken from the best part of the field, and in the warmest situation, in order that the young plants may have good roots, without which they would make but an indifferent progrefs when planted out.

Having thus given directions for the raising of woods, both by young sets and from acorns, I now proceed to their future management, which must be the same in both. And first, the rows being four feet asunder, and the plants two feet distant in the rows, they may stand in this manner for twelve or fourteen years, when every second plant may be taken out and sold for hoops or small poles. Now, though I say in twelve or fourteen years the plants will be of use for these purposes, yet this is only a general rule, as the different goodnefs of the land will make a great variation in the growth of the plants; and consequently, if the trees take to growing well, they will want thinning sooner. This businefs therefore, should be left to the discretion of the person intrusted with the care of the plantation.

After every second plant is taken away, let the roots be grubbed up, not only because they will pay for their grubbing as fire-wood, but that there may be more room given for the standing plants freely to extend their roots.

The plants being now four feet asunder each way, they will require no more thinning for seven or eight years, when the healthiest and best thriving trees must be marked to stand for timber, and the others cut down for poles, and their roots left to produce future under-wood.

In this manner the rows filled with plants from the nursery must be managed, in which case we can speak with precision with regard to thinning. The same husbandry must be applied to the rows under cultivation from the seed; but the planter in this last method must be left to form his own ideas in respect to thinning, as no human knowledge can determine, before hand, how thick the seedling plants will appear in the rows. In rocky and mountainous soils, the plants or acorns must be put down irregularly by the spade, and the planter must be directed in this operation by the particular circumstances of the soil and situation.

BOOK I. be planted at more remote distances, and free from all incumbrances: and this upon consideration, how slowly a full grown Oak mounts upwards, and how speedily it spreads and dilates itself to all quarters, by dreſsing and due culture, so as above forty years advance is to be gained by this only industry: and if thus his Majesty's forests and chases were stored, viz. with this spreading tree at handsome intervals, by which

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In all cases of planting, shelter and warmth are particularly required. Where the plantations are flat, it may be advisable to skirt the wood with Scotch Fir, which, being a hardy and quick-growing tree, is well calculated for this purpose.

Birch is sometimes put between the rows of Oaks, and in mountainous situations this is a good method; others recommend the Fir for this purpose, but it is apt to vegetate too fast and over-top the Oaks.

I shall now consider our plantation as far advanced, in which case a particular attention should be paid to the trees left for timber. These should stand from twenty to thirty feet distant from each other, which will not be too near where the trees thrive well; in which case their heads will spread, so as to meet in about thirty or thirty-five years; nor will this distance be so great as to impede the upright growth of the trees. This distance is recommended, that the trees may enjoy the whole benefit of the soil; therefore, after one crop of the under-wood, or at the most two crops are cut, I would advise the stubbing up the stools, that the ground may be entirely clear for the advantage of the growing timber, which is what should be principally regarded; but, in general, most people attend more to the immediate profit, of the under-wood than the future good of the timber, and frequently by so doing spoil both; for if the under-wood be left after the trees have spread so far as that their heads meet, the under-wood will not be of much value; and yet, by their stools being left they will draw a great share of nourishment from the timber-trees, and retard them in their growth.

Such Gentlemen as are desirous of raising Oaks to plant out for standards, either in parks or in fields, for clumps, or for avenues, must train them in the following manner: Having raised them in the seed-bed, as before directed, let them remain there two years; after which a piece of good ground must be prepared for their reception, where they must grow until they are of a size sufficient to be planted out where they are designed to remain. This ground must be trenched, or double dug; then taking the plants out of the seed-bed, as before directed, let a man and boy plant them upon this new double-dug ground, at the distance of two feet row from row, and a foot and a half asunder in the rows. Every winter, until the plants are taken out of this nursery, the ground should be dug between the rows; and this is what gardeners call *turning-in*. They will require no other pruning than taking off any unsightly side-shoot; or where the tree is inclined to be forked, taking off the weakest branch. Nor is any other precaution neceſsary until the time for their being planted out to continue, which must be done as follows:

First, carefully take the trees out of the nursery, and then prune the roots, which must be done by holding the plant in your left hand, that the stroke of the knife in the right

grazing might be improved for the feeding of deer and cattle under them (for such was the old Saltus) benignly visited with the gleams of the sun, and adorned with the distant landscapes appearing through the glades and frequent vallies, nothing could be more ravishing. We might also sprinkle fruit-trees amongst them for cyder, and many singular uses, and should find such goodly plantations the boast of our rangers, and forests infinitely

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may so cut the bottom of the root that the wound may be downwards; next, take off all bruised and broken parts of the root; and having holes prepared, in the figure of a circle, three feet in diameter and a foot and half deep, (the sward being worked and chopped small in the bottom of the holes, and some mould laid to cover it) plant the trees in such a manner that the top of the roots may be nearly level with the surface of the ground. Let the finest of the mould which was under the turf, be preserved to lap the root in; and after the earth has regularly filled the hole, let it be prefsed down with the foot, to settle it properly to the root. A little litter should be laid over the root, to prevent the wind and sun from drying the mould, and thereby retarding the growth of the tree, especially if the planting be deferred till the spring. The plants which are of a larger size, should be properly staked to secure them from the violence of the winds; or, if they are planted where cattle or deer can come, they should be properly hurdled. After this, they will require no further care.

Oaks will not aspire to such height, or fineneſs of trunk, when planted in these places, as in woods; but they will form most beautiful heads, and their shade will be extensive and large:

> ——————————Behold yon Oak,
> How stern he frowns, and with his broad brown arms
> Chills the pale plain beneath him. MASON.

The Oak will grow and thrive upon almost any soil, provided the trees be properly planted, though we cannot suppose that their growth will be equal in all places. A rich deep loamy earth is what Oaks most delight in, though they will grow exceedingly well in clays of all kinds and on sandy soils, in which last the finest grained timber is produced. Many fine trees of this texture may now be seen growing upon Nottingham forest, particularly at Welbeck.

Having thus given a minute detail of the different methods of raising an Oak wood from the *Acorn*, the *Seed-bed*, and the *Nursery*, we are now arrived at a very important and interesting question: which makes the best Timber? Mr. Evelyn decides for sowing; and if a careful observer will look into the woods that have been sown, and at the same time examine such as have been planted, he will not hesitate a moment to declare in favour of the excellent Author of this Treatise. The extensive plantations that have been carried on for these many years past, have been made more with a view to Shade, Shelter, and Ornament, than to the propagation of timber; and, in order to obtain these ends in the most expeditious manner, the owners have in general followed a mistaken notion, and

BOOK I. preferable to any thing we have yet beheld, rude and neglected as they are. I say, when his Majesty shall proceed, as he hath designed, to animate this laudable pride into fashion, forests and woods, as well as fields and inclosures, will present us with another face than now they do. And here I cannot but applaud the worthy industry of old Sir Harbotle Grimstone, who, I am told, from a very small Nursery of Acorns,

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planted their trees too old; so that many of these woods, when they come to be felled, will greatly disappoint the expectations of the purchasers. Besides, such advanced trees when drawn from the nursery, unlefs planted in a good soil, will never come to good timber. On the contrary, rocky and poor soils may be made to produce excellent timber by judiciously sowing the seeds, and carefully defending the young plants from the browsing of sheep and cattle, or the cropping of hares and rabbits. By this practice, the plants are attached to their native earth, and are strangers to the inconveniences that trees taken from a nursery are exposed to.

In Scotland, and in some of the northern counties of this kingdom, the practice of sowing their waste lands with acorns, chesnuts, beech-mast, fir-seeds, ash-keys, &c. is much recommended, and there is not the least doubt, but that posterity will enjoy the benefits arising from this judicious practice. The expence attending the sowing an acre of waste land with various seeds of forest-trees, is trifling when compared with that of planting; and if all other things were equal, that alone would be decisive. In the neighbourhood of coal and lead mines, and iron forges, such woods will become highly profitable at an early period; and considering the great demand that is constantly made from such places for all kinds of wood, it is matter of surprise that the cheap method of raising woods from seeds and seedling plants has been so long neglected.

In some parts of Scotland, the seedling firs are put into the earth without any sort of preparation. A hole being bored through the heath with an iron instrument, made in the form of a large gimblet, the seedling is immediately introduced. By this management the soil is prevented from opening in hot weather to the prejudice of the young plant. Instead of being pointed, the instrument is flattened at the extremity, like a chifsel, with a nick in it by which the plant is drawn down to the bottom of the hole made to receive it. But of this I shall probably have occasion to speak more fully on the chapter upon firs.

I have already remarked, that under every circumstance of sowing or planting, especially the former, the utmost care must be taken to fence off the young plants, lest cattle and sheep should break in and render the pains of the planter abortive:

> Texendæ sepes etiam, et pecus omne tenendum est:
> Præcipue dum frons tenera imprudensque laborum:
> Cui super indignas hyemes, solemque potentem,
> Sylvestres uri afsidue capreæque sequaces
> Illidunt: Pascuntur oves, avidæque juvencæ.

which he sowed in the neglected corners of his ground, did draw forth such numbers of Oaks of competent growth, as being planted about his fields in even and uniform rows, about one hundred feet from the hedges, bushed and well watered till they had sufficiently fixed themselves, did wonderfully improve both the beauty and the value of his demesnes.—But I proceed.

Frigora nec tantum canâ concreta pruinâ
Aut gravis incumbens scopulis arentibus æstas;
Quantum illi nocuere greges, durique venenum
Dentis, et admorso signata in stirpe cicatrix. VIRG.

Under some particular circumstances it may be proper to cover rocky and exposed situations with Oaks raised in a nursery. In such cases we should always plant from the seed-bed: and in order to bring up the young Oaks, where the aspect and situation happen to be unfriendly, it should be recommended to skirt the wood, to a sufficient thickneſs, with Scotch Firs, mixing some of them in the body of the wood. In this manner an exposed situation may be made to produce excellent timber; and when the trees are grown to a size sufficient for their own protection, the firs in the centre, which I call the nurses, should be removed, otherwise they will injure the young Oaks:

——————————Foster'd thus,
The cradled hero gains from female care
His future vigour; but, that vigour felt,
He springs indignant from his nurse's arms,
He nods the plumy crest, he shakes the spear,
And is that awful thing which heav'n ordain'd
The scourge of tyrants, and his country's pride. MASON.

On the judicious thinning and cleaning a young wood, depends much of the planter's succeſs and profit; on which account all gentlemen who engage deeply in planting will find it highly neceſsary to appoint proper persons, whose office shall be solely confined to the superintendance of the woods. From a neglect in this particular, the hopes of half a century may be thrown away in a period of a few years.

The method of seedling-planting comes nearest to the nature of sowing, and is generally connected with it in all large undertakings; but I must refer the reader to the notes upon the different forest-trees in the course of this work, where the judicious practice of planting from the seed-bed is occasionally recommended.

It often happens, from natural or accidental causes, that planted Oaks grow stunted and crooked; in such cases they should be cut down at a proper season. In consequence of this judicious practice, a clean leading shoot will be obtained that will soon overtake the cotemporary trees that have not undergone the same operation. But it must be considered that no Oak should be thus headed down till two or three years after planting, or

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4. Both these kinds should be taken up very young, and transplanted about October; some yet, for these hardy and late springing trees, defer it till the winter be well over, but the earth had need be moist; and though they will grow tolerably in moist grounds, yet do they generally affect the sound, black, deep, and fast mould, rather warm than over wet and cold, and a little rising, for this produces the firmest timber; though

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until it has completely rooted itself in the ground. Many other kinds of Forest-trees, under similar circumstances, may be treated in the same manner; but we must except all the Pine tribe from this operation, as in them the lofs of the leading shoot is the certain lofs of the tree.

An opinion generally prevails, that good lands should always be employed in Meadow, Pasture, and Tillage, and that none but the barren and rocky soils should be planted.—Such an idea is by no means founded on truth, as it may be demonstrated, that good land lying remote from a town, and near a navigable river or canal, will yield a better profit when planted, than if it had been employed in pasturage and tillage. There is, I confefs, some difference, when we consider that in the one case, the profits are annual and small, and in the other distant and large, which circumstance must materially affect the inclinations of some people; but a true Patriot, and all Planters are Patriots, will forego the present profits, and rest satisfied with having handed down to posterity a blefsing of inestimable value. Full of this idea, the Patriot will set apart some good land for the generous purpose of raising timber, which at some future period may be employed in building ships for the advancement of our commerce, and the security of our island:

> Let India boast her plants, nor envy we
> The weeping amber and the balmy tree,
> While by our Oaks the precious loads are born,
> And realms commanded which those trees adorn. POPE.

As a farther encouragement to the generous planter, it may be remarked, that the best lands always produce the cleanest, quickest, and best growing timber; at the same time, the underwood springs up with an amazing and profitable luxuriancy. To such men the soil is always grateful.

When a large tract of land is designed for wood, especially if it be of an indifferent quality, it may be advantageous to attend to the following method which was recommended to me by a Gentleman long conversant in the practice of raising woods. But it must be observed, that this method can only be complied with in places where the plough can be introduced.

Plough the whole in October or November, and in the following spring plough and harrow so as effectually to destroy the turf. The land being reduced to an excellent tilth, sow it with turnip-seed about the third week in June, and when the plants are sufficiently advanced let them be carefully hoed, which operation must be repeated at a proper inter-

my Lord Bacon prefers that which grows in the moisture grounds for ship-timber, as the most tough, and lefs subject to rift. But let us hear Pliny: "This is a general rule," saith he, "what trees soever they be "which grow tolerably, either on hills or vallies, arise to greater stature, "and spread more amply in the lower ground; but the timber is far "better, and of a finer grain, which grows upon the mountains, ex- CHAP. III.

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val. After this, the crop, if pofsible, should be eaten upon the ground with sheep. Upon the same land another crop of turnips should be taken the succeeding year; after which the ground will be in clean and excellent condition for receiving the acorns and seeds of Forest-trees. These should be committed to the earth in the following manner:

Early in the Spring, upon one ploughing, sow one bushel, or three pecks, of oats, and at the same time sow the neceſsary quantity of acorns, chesnuts, ash-keys, beech-mast, fir-seeds, &c. After this, let the whole be harrowed to cover the seeds. As in all extensive tracts there are a variety of soils, it will be most judicious to sow the different seeds upon such parts as are most suitable to their respective natures. Besides, some trees, though they delight in the same sort of soil, do not grow kindly together: so that the planter will do well to consider this, and only mix such together as are found, by general practice, to grow friendly to each other. And here I beg leave to remark, that where the turnips are cultivated in drills, and well horse-hoed, the land will be in better condition for receiving the acorns, &c. than if the broad-cast method had been pursued.

In this manner an extensive wood may be raised at a small expence, as the turnip and oat crops will pay the expence of ploughing, seed, rent, and incidental charges. The tender plants being nourished, warmed, and protected by the oat stalks, will make vigorous shoots, and, having no weeds to struggle with the first summer, will push forward with amazing vigour. As the land sown in this manner will be fully stocked with plants, the feet of the reapers employed in cutting down the oats will not materially affect the seedling Oaks, which before the autumn will have made a considerable progreſs. The Firs, from the slowneſs of their growth, will be secure from injury, and the Ashes cannot be hurt, as they do not vegetate till the second year. In some parts of Norfolk, where the land, in general, is of a sandy nature, with a bed of clay or marl underneath, it is recommended by the author of the above instructions, to raise an Oak wood by sowing the acorns with a crop of spring rye: and I am well informed of the succeſs of that method in one instance. A wood raised in this natural manner will not only make the best timber for the uses of the carpenter and ship-builder, but will arrive at maturity many years sooner than one of the same age raised from plants drawn from the nursery. The tap-root of all trees corresponds with the leading shoot; so that when it is cut off, as in planting from the nursery, the tree is weakened in its leading shoot, but puts out more vigorously in its lateral ones. An attention to the correspondence between the branches and roots solves many of the phænomena in pruning and planting.

A wood raised in this cheap and easy manner may be thinned at proper seasons, leaving the most thriving trees to stand for timber, or (which is the most profitable way) it

BOOK I. "cepting only Apple and Pear trees." And in cap. xxxix. lib. xvi.— "The timber of those trees which grow in moist and shady places is not "so good as that which comes from a more exposed situation, nor is "it so close, substantial, and durable:" Upon which he much prefers the timber growing in Tuscany, before that towards the Venetian side, and upper part of the Gulph. And that timber, so grown, was in

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may be converted into a spring wood, in which case no timber should be left standing, as the copse wood will be retarded in its growth by the over-dripping of the large trees.— According to the goodneſs of the land, the spring wood will arrive sooner or later at maturity; and as wood of that kind is a regular and constant income, after a term of years, it becomes a very advantageous method of applying land in all countries where fuel is dear.

As much depends upon keeping the seedling plants clear from weeds, it might be an improvement to the plan, if, after the Oats are harrowed in, drills were drawn with a light plough all over the field at the distance of four feet from each other. Into these let the acorns, chesnuts, and other seeds be sown, after which they may be covered with rakes; the thickneſs, however, of the covering, and the deepneſs of the drills, must be regulated by the nature of the soil and the seed sown. A wood raised in this manner may be cleaned at a small expence by horse-hoeing the intervals, and hand-hoeing and thinning the rows at proper seasons; for which neceſsary operations, consult the directions already given for cleaning Oaks drawn from the nursery, and planted in rows. In Livonia, Courland, and Poland, where the Pine and Fir grow in abundance, it is the practice to prepare the land as for grain, and then sow it with Pine and Fir seeds in the month of April. The whole is afterwards left to nature. And thus being sown thick, the strong plants smother the weaker, and the wood advances apace. In consequence of the close standing of the trees, the lower branches drop off soon, which clears the timber of knots. In these countries it is esteemed an injudicious practice to thin the woods till the most vigorous trees are arrived at the height of twenty feet, and then the low and smothered plants are removed. When the wood is arrived at maturity, the whole is cut down, and every fifty or sixty yards a Pine, or Fir, is left standing to stock the land with seeds, the ground being carefully harrowed at the time the cones of the mother trees begin to open. Others again judge it better to leave a deep skirting of trees round the place cleared of wood, with the same precaution of harrowing the ground at the time when nature points out her sowing season.

The celebrated Marquis of Turbilly, speaking of woods raised from seeds, says, "woods thus raised out-grow, even in a few years, those that have been planted at the same time, and cultivated by digging and dreſsing at a great expence. No trees are taller, straighter and of a finer bark."

In this place I judge it neceſsary to remark, that the above directions are drawn from the most approved authors, as well as the private information of gentlemen well con-

great esteem long before Pliny, we have the spear of Agamemnon formed from a tree so exposed; and Didymus gives the reason, "For that being continually weather-beaten, they become hardier and tougher." Otherwise, that which is wind-shaken never comes to good; and therefore when we speak of the climate, it is to be understood of vallies rather

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versant in the practice of planting; but as all countries differ in a variety of circumstances, I wish to be understood as only laying down rules subject to a necessary variation. There is nothing so dangerous in planting as obeying too servilely the directions given in books: something must be left to the planter himself.

I have a particular satisfaction in laying before my readers the following letter, written by Mr. Speechly, gardener to the Duke of Portland, describing the method of forming plantations upon his Grace's estate in the county of Nottingham. It is a valuable piece of practical information, and merits our utmost attention.

——————"Few Noblemen plant more than his Grace the Duke of Port-"land: and I think I may say, without vanity, none with greater success. But as no man "should think of planting in the very extensive manner that we do, before he is provided "with well-stocked nurseries, it may not be amiss, before I proceed further, to give a short "sketch of that necessary business, as also to inform you of the soil and situation of our "seat of planting. The greatest part of our plantations is on that soil, which, in Not-"tinghamshire, is generally distinguished by the name of Forest-land. It is a conti-"nuation of hills and dales; in some places the hills are very steep and high; but in ge-"neral the ascents are gentle and easy.

"The soil is composed of a mixture of sand and gravel; the hills abound most with "the latter, and the vallies with the former, as the smaller particles are by the wind and "rains brought, from time to time, from the high grounds to the lower. It is on the hilly "grounds we make our plantations, which in time will make the vallies of much greater "value, on account of the shelter they will afford.

"After his Grace has fixed on such a part of this Forest-land as he intends to have "planted, some well-situated valley is chosen, (as near the centre of the intended plan-"tations as may be) for the purpose of a nursery; if this valley is surrounded with hills "on all sides but the south, so much the better. After having allotted a piece of ground, "consisting of as many acres as is convenient for the purpose, it is fenced about in such a "manner as to keep out all obnoxious animals. At either end of the nursery are large "boarded gates, as also a walk down the middle, wide enough to admit carriages to go "through, which we find exceedingly convenient when we remove the young trees from "thence to the plantations. After the fence is completed, the whole is trenched (except "the walk in the middle) about twenty inches deep, which work may be done for about "three pounds ten shillings, or four pounds, per acre, according as the land is more or "less gravelly; this work is best done in the spring when the planting season is over. If

BOOK I. than hills, and in calm places, than exposed, because they shoot straight and upright. The result of all is, that upon occasion of special timber, there is a very great and considerable difference; so as some oaken timber proves manifestly weaker, more spungy, and sooner decaying than other. The like may be affirmed of Ash, and other kinds; and generally speaking, the close-grained is the stoutest and most permanent: but

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" after the trenching, two or three chaldrons of lime be laid on an acre, the land will " produce an excellent crop either of cabbages or turnips, which being eaten off by sheep " in the autumn, will make the land in fine order for all sorts of tree-seeds: but as the " Oak is the sort of tree we cultivate in general, I shall confine myself particularly to our " present method of raising and managing that most valuable species. In the autumn " after the cabbage or turnips are eaten off, the ground will require nothing more than a " common digging. So soon as the acorns fall, after being provided with a good quantity, " we sow them in the following manner: Draw drills with a hoe in the same manner as is " practised for pease, and sow the acorns therein so thick as nearly to touch each other, " and leave the space of one foot between row and row, and between every fifth row " leave the space of two feet for the alleys. While the acorns are in the ground great " care must be taken to keep them from vermine, which would very often make great " havock amongst the beds, if not timely prevented. Let this caution serve for most " other sorts of tree-seeds.

" After the acorns are come up, the beds will require only to be kept clean from weeds " till they want thinning; and as the plants frequently grow more in one wet season, " where the soil is tolerably good, than in two dry ones, where the soil is but indifferent, " the time for doing this is best ascertained by observing when the tops of the rows meet. " Our rule is to thin them then, which we do by taking away one row on each side the " middlemost, which leaves the remaining three rows the same distance apart as the " breadth of the alleys. In taking up these rows we ought to be anxiously careful neither " to injure the roots of the plants removed, nor of those left on each side. The rest of the " young Oaks being now left in rows at two feet apart, we let them again stand till their " tops meet; then take up every other row, and leave the rest in rows four feet asunder, " till they arrive to the height of about five feet, which is full as large a size as we ever " wish to plant. In taking up the two last sizes, our method is to dig a trench at the end " of each row full two feet deep, then undermine the plants, and let them fall into the " trench with their roots intire.

" And here let me observe, that much, very much, of their future succefs depends on " this point of their being well taken up. I declare that I should form greater hopes from " one hundred plants well taken up and planted, than from ten times that number taken " up and planted in a random manner; besides, the lofs of the plants makes the worst " method the most expensive.

" But before I leave this account of our method of raising Oaks, I shall just beg leave " to observe, that we are not very particular in the choice of acorns; in my own opinion

of this let the industrious consult that whole tenth chapter in the second book of Vetruvius, where he expreſsly treats of this argument, *de Abiete supernate et infernate, cum Appennini descriptione:* where we note concerning Oak, that it neither prospers in very hot nor exceſsive cold countries; therefore there is little good of it to be found in Africa, or, indeed, in the lower and most southern parts of Italy, (but the Venetians

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" it matters not from what sort of tree the acorns are gathered, provided they are good; " for although there seems to be a variety of the English Oak, in respect to the form " of the leaf and fruit, also their coming into leaf at different seasons, with some other " marks of distinction, yet I am of opinion that they will all make good timber-trees, " if properly managed: It is natural to suppose that a tree will grow low and spreading " in a hedge-row; on the contrary, it is very improbable that many should grow " so in a thick wood, where, in general, they draw one another up straight and tall. " And I have observed that the same distinctions hold good amongst our large timber-trees " in the woods, as in the low-spreading Oaks in the hedge-rows.

" Though I have not as yet taken notice of any other sort of tree but the Oak, yet we " have a great regard for, and raise great quantities of Beech, Larch, Spanish Chesnut, " Weymouth Pine, and all sorts of Firs, the Scotch excepted, as well as many other kinds, " by way of thickening the plantations while young; amongst which the Birch has hitherto " been in the greatest estimation, it being a quick growing tree, and taking the lead " of most other sorts on our poor forest-hills; and as we have an inexhaustible spring " of them in the woods, where they rise of themselves in abundance from seed, we " at all times plant them plentifully of different sizes. As to the Elm and Ash, we plant " but few of them on the forest, though we raise great quantities of both, but particularly " the Ash, which being an useful wood (but a bad neighbour amongst the Oaks) " we plant in places apart by itself. I shall dismiſs this subject concerning the manage- " ment of our nurseries, after saying a word or two relating to pruning: We go over the " whole of the young trees in the nursery every winter; but in this we do little more than " shorten the strong side-shoots, and take off one of all such as have double leads.

" Having thus pointed out the mode of forming and managing our nurseries, I shall now " proceed to the plantations. The size of the plantations, at first beginning, must " be in proportion to the stock of young trees in the nursery; for to undertake to plant " more ground than we have young trees to go through with for thick plantations, would " turn to poor account on our forest hills. We always plant thick, as well as sow " plentifully at the same time, provided it be a season in which acorns can be had; so that " all our plantations answer in a few years as nurseries to succeeding plantations.

" As to the form of the plantations, they are very irregular: We sometimes follow a chain " of hills to a very great distance; so that what we plant in one season, which perhaps " is sixty, eighty, and sometimes an hundred acres, is no more than a part of one great " design.

" If the ground intended to be planted has not already been got into order for that " purpose, it should be fenced about at least a twelvemonth before it is wanted to plant

BOOK I. have excellent timber,) nor in Denmark or Norway, comparable to ours, it chiefly affecting a temperate climate; and where it grows naturally in abundance, it is a promising mark of it. If I were to make choice of the place, or the tree, it should be such as grow in the best cow-pasture, or up-land meadow, where the mould is rich and sweet, (Suffolk affords an admirable instance,) and in such places you may also transplant

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" on, and immediately got into order for a crop of turnips; two chaldrons of lime being " laid on an acre will be of great service, as it will not only be a means of procuring " a better crop of turnips, but will bind the land afterwards, and make it fall heavy, which " is of great use when it comes to be planted, as some of the forest-land is so exceedingly " light as to be liable to be blown from the roots of the young trees after planting: " Therefore we find it to be in the best order for planting about two years after it has been " ploughed up from pasture, before the turf is too far gone to a state of decay. It will " be necessary to have a part of the turnips eaten off soon in the autumn, in order to get " the ground into readiness for early planting; for we find the forward planting generally " succeeds the best.

" After the turnips are eaten off, we plough the ground with a double-furrow trenching " plough made for that purpose, which, drawn by six horses, turns up the ground com- " pletely to the depth of twelve or thirteen inches: This deep ploughing is of great " service to the plants at the first, and also saves a great deal of trouble in making " the holes. After the ploughing is finished, we divide the ground into quarters for " the planting by ridings. It will be a difficult matter to describe the laying out the " ground for this purpose, especially where there is such a variety of land as we have " on the forest; much depends on the taste of the person employed in this office.— " Between the hills, towards the outsides of the plantations, we frequently leave the " ridings from sixty to an hundred yards in breadth, and contract them towards the " middle of the woods, to the breadth of ten or twelve yards; and on the tops of the " hills where there are plains, we frequently leave lawns of an acre or two, which " makes a pleasing variety.

" In some of them we plant the Cedar of Libanus at good distances, so as to form " irregular groves; and this sort of tree seems to thrive to admiration on the forest- " land. On the outsides of the woods, next to the ridings, we plant Ever-greens, " as Hollies, Laurels, Yews, Junipers, &c. and these we dispose of in patches, some- " times the several sorts entire, at other times we intermix them for variety; but not " so as to make a regular screen or edging. Our design in the distribution of these " plants, is to make the outsides of the woods appear as if scalloped with Ever- " greens intermixed sometimes with rare trees, as the *Liriodendron Tulipifera*, the Virginian " Tulip-tree, &c.

" After the ground is laid out into quarters for planting, we assign certain parts to Beech, " Larch, Spanish Chesnuts, &c. These we plant in irregular patches here and there, " throughout the plantations, which, when the trees are in leaf, has the most pleasing " effect, on account of the diversity of shades; especially in such parts of the forest where

large trees with extraordinary succeſs: And therefore it were not amiſs to bore and search the ground where you intend to plant or sow, before you fall to work, since earth too shallow or rocky is not so proper for this timber; the roots fix not kindly, and though for a time they may seem to flourish, yet they will dwindle. In the mean time, it is wonderful to consider how strangely the Oak will penetrate to come to a marly

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" four, five, and sometimes more of the large hill-points meet in the same valley, and tend, " as it were, to the same centre.

" After those patches are planted, or marked out for that purpose, we then proceed " to the planting in general. We always begin with planting the largest young trees " of every sort, and end our work with those of the smallest size; were we to proceed " otherwise, the making a hole for a larger-sized tree, after the small ones are thick " planted, would cause the greatest confusion.

" Birch is generally the sort of tree we make our beginning with, which we find will bear " to be removed with great safety, at the height of six or seven feet, though we commonly " plant rather under than at that size. This sort of tree we are always supplied with " from our plantations of five or six years growth. But before I proceed to the taking " them up, it will be proper to inform you, that in the planting season, we divide our hands " into four claſses, which we term Takers-up, Pruners, Carriers, and Planters: And here " I shall describe the several methods of doing this work.

" First, in taking up we have the same care to take up with good roots in the plantations, " as was recommended in the nursery, though we cannot pursue the same method; but " in both places, so soon as the plants are taken up, we bed them in the ground in the " following manner: Dig a trench at least fifteen inches deep, and set the young trees " therein with their tops aslant, covering their roots well as we go along, and almost half " way up the stem of the plants, with the earth that comes out of a second trench, which " we fill in the like manner, and so proceed on till we have a load, more or leſs, in a heap, " as may be convenient to the place from whence they were taken. In our light soil this " trouble is but little, and we always have our plants secure, both from their roots drying, " and their suffering by frost. We have a low-wheeled waggon to carry them from the " heaps, where they are bedded, to the pruners, and generally take two loads every other " day. When they arrive, the planters, pruners, &c. all aſsist to bed them there, in the " same manner as before described. We have a portable shed for the pruners to work " under, which is also convenient for the rest of the work people to take shelter under " in stormy weather. From the above heaps the plants are taken only so fast as they are " wanted for pruning, which work we thus perform: Cut off all the branches close to the " stem to about half the height of the plant, shortening the rest of the top to a conical " form in proportion to the size of the plant; and in pruning of the roots, we only cut off " the extreme parts that have been bruised by the taking up, or such as have been " damaged by accident, wishing at all times to plant with as much root as can be had.

" As soon as they are pruned they are taken to the planters, by the carriers, who are " generally a set of boys, with some of the worst of the labourers. The planters

BOOK I. bottom; so as where we find this tree to prosper, the indication of a fruitful and excellent soil is certain, even by the token of this natural augury only: thus by the plantation of this tree and some others, we have the advantage of profit raised from the pregnancy, substance, and depth of our land; whilst by the grafs and corn (whose roots are but a few inches deep) we have the benefit of the crust only.

" go in pairs, one makes the holes, and the other sets and treads the plants fast, which " work they commonly do by turns. In making of the holes we always take care to throw " out all the bad soil that comes from the bottom; if the planting be on the side of a hill, " we lay the bad soil on the lower side of the hole, so as to form a kind of bason: for " without this care our plants would lose the advantage of such rains as fall hastily.— " We at all times make the holes sufficiently large, which is done with with great ease " after our deep ploughing.

" Before we set the plant, we throw a few spadefuls of the top soil into the hole, setting " the plant thereon with its top rather inclining to the west; then fill up the hole with " the best top soil, taking care that it closes well with the roots, leaving no part hollow. " When the hole is well filled up, one of the planters treads and fastens the tree firmly " with his feet, while his partner proceeds to make the next hole.

" The fastening a tree well is a material article in planting; for if it once becomes " loose, the continual motion which the wind occasions, is sure to destroy the fibres as fast " as they are produced, which must end in the destruction of the plant, if not prevented. " It is to guard against this inconveniency that we take off so much of the top, as has been " described in the article of pruning.

" We plant about three or four hundred Birches of the large size on an acre, and nearly " the same number of the first-sized Oaks; we also plant here and there a Beech, Larch, " Spanish Chesnut, &c. exclusive of the patches of the said sorts of trees before planted.— " We then proceed to plant plentifully of the second and lefser-sized Oaks; and last " of all a great number of the small Birches, which are procured from the woods at about " three shillings or three shillings and sixpence per thousand: These we remove " to the succeeding plantations after the term of five or six years. Of the several " sizes of the different kinds of trees we generally plant upwards of two thousand " plants upon an acre of land, all in an irregular manner.

" After the planting is finished we then sow the acorns, (provided it be a season that " they can be had,) all over the plantation, except amongst the Beech, Larch, &c. in the " aforesaid patches. Great care should be taken to preserve the acorns intended for this " purpose, as they are very subject to sprout, especially soon after gathering; the best " method is to lay them thin in a dry airy place, and give them frequent turnings.— " We sow these acorns in short drills of about a foot in length, which work is done very " readily by two men, one with the acorns, the other with a hoe for the purpose of making " the drills and covering the seed.

" We are of opinion that the plants produced from these acorns will at last make " the best trees; however, I will not pretend to say how that may be, as the Oaks

5. But, to discourage none, Oaks prosper exceedingly even in gravel, and moist clays, which most other trees abhor; yea, even the coldest clay grounds that will hardly graze: But these trees will frequently make stands, as they encounter variety of footing, and sometimes proceed again vigorously, as they either penetrate beyond, or outgrow their obstructions, and meet better earth; which is of that consequence,

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" transplanted small, grow equally well for a number of years: But it is probable that " a tree with its tap-root undisturbed may, in the end, grow to a much larger size.

" After the whole is finished to a convenient distance round the pruners, we then " remove their shed to a second station, and there proceed in the like manner; and " so on till the whole be finished.

" It would be well to get the planting done by the end of February, especially for trees " of the deciduous kind; but from the disappointments we meet with, occasioned by the " weather, we are sometimes detained to a later season.

" I have several times made trial of twelve or fourteen kinds of American Oaks sent " over to his Grace in great quantities. I sowed them in the nursery, and also in the " best and most sheltered part of the plantations. In both places they come up very " plentifully; but I now find that several of the sorts will not stand the severity of our " winters, and those that do make so small a progress as to promise no other encouragement " than to be kept as curiosities.

" Towards the end of April, when the ground is moist, it will be of great service " to go over the whole plantations, and fasten all such trees as are become loose since " their planting: After this, nothing more will be required till the month of June, when " we again go over the whole with hoes, cutting off only the tall-growing weeds; for the " sooner the ground gets covered with grass, in our light soil, so much the better.

" I own there is something slovenly in the appearance of this method, and on some " lands I would recommend keeping the ground clean hoed for some time at first, as also " planting in rows, which in that case would be necessary. More than once I have " tried this method on our Forest-hills, and always found after every hoeing, that the soil " was taken away by the succeeding winds into the valleys.

" Besides this inconvenience, the reflection of our sandy soil is so very great, that " we find the plants stand a dry season much better in our present method, than in the " former: And whoever fancies that grass will choak and destroy seedling Oaks, will, " after a few years trial, find himself agreeably mistaken: I have even recommended the " sowing the poorer parts of the hills with furze or whin-seed, as soon as they are planted: " We have sometimes permitted the furze to grow in the plantations by way of shelter " for the game, which though it seems to choak and over-grow the Oaks for some time, " yet after a few years we commonly find the best plants in the strongest beds of whins. " This shows how acceptable shelter is to the Oak whilst young; and experience shows " us that the Oak would make but a slow progress on the forest-hills for a number " of years at the first, were it not for some kind nurses; and the Birch seems to answer " that purpose the best, as I have already observed.

BOOK I. that I dare boldly affirm, more than an hundred years advance is clearly gained by soil and husbandry. I have yet read, that there grow Oaks (some of which have contained ten loads apiece) out of the very walls of Silcester in Hampshire, which seem to strike root in the very stones;

"The several sorts of Fir-trees, from appearance, seem to promise a greater shelter; "but on the forest-land thy do not grow so fast, as the former, and what is worse, the "Oak will not thrive under them, as they do immediately under the Birch.

"Where a plantation is on a plain, a screen of Firs for its boundary is of singular "use, but the situation of the forest-land denies us this advantage.

"We continue to cut down the tall-growing weeds two or three times the first "summer, and perhaps once the next, or second season after planting; which is all that "we do in respect to cleaning. The next winter after planting, we fill up the places "with fresh plants where they have miscarried; after which there is little to be done till "about the fourth or fifth year; by which time the small sized Birch, and seedling Oaks, "will be grown to a proper size for transplanting: In the thinning of these due care "must be had not to take too many away in one season, but being properly managed, "there will be a supply of plants for at least half a dozen years to come.

"About the same time that the leſser-sized Birch want thinning, the large ones will "require to have their lower branches taken off, so as to keep them from injuring the "Oaks; and this is the first profit of our plantations; the Birch-wood being readily bought "up by the broom-makers. This pruning we continue as often as required, till the "Birches are grown to a sufficient size to make rails for feneing; we then cut them down "to make room for their betters.

"By this time the Oaks will be grown to the height of twelve or fourteen feet, when "they draw themselves up exceedingly fast: Each plant seems as it were in a ſtate "of strife with its neighbour, and in a strict sense they are so, and on no other terms "than life for life; and he whose fate it is to be once over-topped, is soon after compelled "to give up the contest for ever.

"After the Birches are cut down, there is nothing more to be done but thinning the "Oaks, from time to time, as may be required, and cutting off their dead branches "as frequently as may be neceſsary. We are very cautious in doing the former, knowing "well, that if we can but once obtain length of timber, time will bring it into "thickneſs; therefore we let them grow very close together for the first fifty years.

"And here it may not be improper to observe the progreſs the Oak makes with "us, by describing them in two of our plantations, one of twenty-eight, the other of fifty "years growth. In the former they are in general about twenty-five or twenty-ſix feet "in height, and in girth about eighteen inches: The trees in the latter, planted in 1725, "are something more than sixty feet in height, and in girth a little above three feet; "and these trees are in general about fifty feet in the bole, from which you will easily "conceive the smallneſs of their tops, even at this age.

"It would be a difficult matter to describe their farther progreſs with any degree "of certainty, therefore let it suffice to make this last observation on them in their mature "state.

and even in our renowned forest of Dean itself, some goodly Oaks have been noted to grow upon ground, which has been as it were a rock of ancient cinders, buried there many ages since. It is indeed, observed, that Oaks which grow in rough stony grounds, and obstinate clays, are

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"I should have before observed to you, that in both the aforesaid, as well as in all "the young plantations, the Spanish Chesnut keeps an equal pace, or rather out-grows "the Oak; but it is doubtful whether ever they will arrive at the same size; for the "largest of our Spanish Chesnuts, which have much the appearance of old trees, do not "girth more than twelve or fourteen feet, which is nothing in comparison to some of our "large Oaks, which girth from twenty-five to thirty feet; indeed some of them a great "deal more: For instance, that remarkable tree called the Greendale Oak, (from its "growing in a valley of that name near Welbeck) which in the year 1724 had a hole "cut through its body large enough to admit a coach to go through. This great "curiosity is yet living, and frequently bears acorns, which we carefully save, to be "distributed as presents amongst his Grace's acquaintance.

"I may omit describing to you the present state of this piece of antiquity, as I have "herewith inclosed a drawing of it taken on the spot a few days ago *, from which you "will see, notwithstanding the uncommon size of the lower part of the tree, that it has "never contained any great quantity of timber; I mean in comparison with seve- "ral of our largest Oaks, some of which contain, in their tower-like trunks, between "seven and eight hundred solid feet of timber, exclusive of their stately tops; and some "of their large branches are even like trees themselves.

"You see, Sir, what a surprising mass of wood may arise from a single acorn! Indeed "it really wonderful to see, on some soils, to what an amazing size this King of Trees will "sometimes arrive."

WELBECK, JUNE 16, 1775.

* See Ch. iii. B. iii

Having thus described the most approved methods of raising woods and plantations from the Acorn and the Nursery, I shall now proceed to consider the necessity of reducing them to immediate practice.

And first I shall observe, that the cutting down of all kinds of wood is become so general, that unless some effectual remedy be soon applied, it is more than probable that very little full-grown timber will be left in this island for the use of the ship-builder. The simple apprehension that this nation will, at some distant period, feel this great calamity, cannot but occasion some uneasiness in the minds of those who wish well to their country. But when the most serious and positive proofs can be produced, that, at this very moment, the royal navy is in want of that supply, how justly are our fears increased!—and with what zeal ought we to join in warding off the impending danger.

In the year 1763, Mr. Roger Fisher, an eminent ship-builder at Liverpool, actuated by a very laudable spirit for the interest of his country, laid before the public a number of original letters written by persons conversant in the purchase of ship-timber in almost every county of this kingdom. In 1771, the Hon. Augustus Hervey desired these letters to be republished, which was accordingly done; and much about the same time, Mr.

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long before they come to any considerable stature, (for such places, and all sorts of clay, is held but a step-mother to trees,) but in time they afford the most excellent timber, having stood long, and got good footing. The same may we affirm of the lightest sand, which produces a smoother-

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Fisher received a summons to attend a Committee of the House of Commons, before whom he gave a faithful narrative of what he personally knew of the then scarcity of Oak-timber. In consequence of his examination, and other informations exhibited by creditable dealers in wood, an act was obtained to encourage the growth of timber upon commons and waste lands: But how far the inclinations of the people have co-operated with the wisdom of the legiſlature, I am unable to determine.

As an inducement to raise plantations of useful timber, I shall here observe, that many of the ships which gave laws to the whole world in the last war, were constructed from Oaks planted soon after the publication of Mr. Evelyn's Silva; and I flatter myself that the present *Republication* will be the means of raising the same virtuous and patriotic spirit. We have just before us a princely example: His present Majesty has with royal munificence, ordered a nursery, consisting of twenty acres of land, to be formed upon the forest of Knaresbrough, to which the tenants of the crown are to have unlimited acceſs for the purpose of supplying themselves *(gratis)* with young Oaks, and all sort of trees proper for the forest.

It is remarkable that the Oak was held sacred by the Greeks, the Romans, the Gauls, and Britons. Among the Romans this tree was dedicated to Jupiter, as we are informed by Pliny: "Arborum genera numinibus suis dicata perpetuo servantur, ut Jovi Esculus." By the Britons it was held in great veneration; and some of the most solemn ceremonies of the Druids were held under its sacred shade. The ceremony of cutting the mistletoe is circumstantially described by Cæsar, Tacitus, and Pliny.

The acorns, produced by the different species of Oaks, are supposed to have constituted part of the food of mankind in the early ages of the world. Lucretius, speaking of the first age, says,

> Glandiferas inter curabant corpora quercus
> Plerumque.———— LIB. V. ver. 937.

Virgil celebrates Ceres for having first taught mankind how to grow corn for food:

> Prima Ceres ferro mortales vertere terram
> Instituit: cum jam glandes atque arbuta sacræ
> Deficerent sylvæ, et victum Dodona negaret. GEORG. i. 147.

And in consequence of this great obligation, the Roman husbandmen, before they began their harvest, always crowned their heads with wreaths of Oak in honour of Ceres:

> ————Neque antè
> Falcem maturis quisquam supponat aristis,
> Quam Cereri, torta redùnitus tempora quercu,
> Det motus incompositos, et carmina dicat. GEORG. i. 347.

grained timber, of all other the most useful for the joiner; but that which grows in gravel is subject to be frow, as they term it, and brittle. What improvement the stirring of the ground about the roots of Oaks is to the trees, I have already hinted; and yet in copses, where they stand warm, and so thickened with under-wood as this culture cannot be practised, they prove in time to be goodly trees. I have of late tried the graffing of Oaks, but as yet with slender succeſs. Ruellius indeed affirms it will take the Pear and other fruit; and if we may credit the poet, CHAP. III.

——————————Aurea duræ
Mala ferant Quercus.—————— ECL. viii.

The sturdy Oak does golden Apples bear.

———Glandemque sues fregere sub ulmis. GEORG. ii.

And greedy swine from grafted Elms are fed,
With falling acorns that on Oaks are bred.

Which last I conceive to be the more probable; for that the sap of the Oak is of an unkind tincture to most trees: but for this improvement, I would rather advise inoculation, as the ordinary Elm upon the Wich-Hasel, for those large leaves we shall anon mention, and which are so familiar in France.

6. That the transplanting of young Oaks gains them ten years advance, some happy persons have affirmed. From this belief, if in a former impreſsion I have desired to be excused, and produced my reasons for it, I shall not persist against any sober man's experience; and therefore leave this article to their choice, since, as the butcher's phrase is, change of pasture makes fat calves; and so transplantations of these hard-wood trees, when young, may poſsibly, by a happy hand, in fit season, and other circumstances of soil, sun, and room for growth, be an improvement. But as for those who advise us to plant Oaks of too great a stature, they hardly make any considerable progreſs in an age; and therefore I cannot encourage it, unleſs the ground be extraordinarily qualified, or that the Oak you would transplant be not above six or seven feet in height; yet if any be desirous to make trial of it, let their stems be of the smoothest and tenderest

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bark, for that is ever an indication of youth, as well as the paucity of their circles, which, in disbranching and cutting the head off at five or six feet in height (a thing, by the way, which the French usually spare when they transplant this tree) may, before you stir their roots, serve for the more certain guide; and then plant them immediately, with as much earth as will adhere to them, in the place destined for their station, abating only the tap-root*, (which is that downright and stubby part of the roots which all trees raised of seeds do universally produce,) and quickening some of the rest with a sharp knife (but sparing the fibrous, which are the main suckers and mouths of all trees) spread them in the fofs or pit which hath been prepared to receive them: I say in the fofs, unlefs you will rather trench the whole field, which is incomparably the best way, and infinitely to be preferred before narrow pits and holes, as the manner is, in case you plant any number considerable, the earth being hereby made loose, and easier penetrable for the roots, about which you are to cast that mould which, in opening of the trench, you took from the surface, and purposely laid apart, because it is sweet, mellow, and better impregnated. But, in this work, be circumspect never to inter your stem deeper than you found it standing, for profound burying very frequently destroys a tree, though an error seldom observed. If, therefore, the roots be sufficiently covered to keep the body steady and erect, it is enough; and the not minding of this trifling circumstance does very much deceive our ordinary wood-men, as well as gardeners, for most roots covet the air, though those of the Quercus Urbana least of any; for, like the Esculus,

* Which yet some upon good experience, will not allow in transplanting young Oaks; affirming the taking them up without any abatement, or the least wound, does exceedingly advance the growth of this tree above such as are deprived of it.

——Quæ quantum vertice ad auras
Ætherias, tantum radice in Tartara tendit. GEORG. ii.

High as his topmost boughs to heaven ascend,
So low his roots to hell's dominion tend.

And the perfection of that does almost as much concern the prosperity of a tree, as of a man himself, since *Homo* is but *Arbor inversa;* which prompts me to this curious but important advertisement, *that the position be likewise sedulously observed.*

7. For the southern parts of all trees being more dilated, and the pores exposed (as evidently appears in their horizontal sections) by the constant

excentricity of the hyperbolical circles, (save just under the equator, where the circles concentre, as we find in those hard woods which grow there,) ours, being now on the sudden, and at such a season, turned to the north, does starve and destroy more trees, how careful soever men have been in ordering the roots, and preparing the ground, than any other accident whatsoever, neglect of staking and defending from cattle excepted; the importance whereof caused the best of poets, and most experienced in this argument, when giving advice concerning this article, to add, CHAP. III.

> Quin etiam cœli regionem in cortice signant:
> Ut, quo quæque modo steterit, quâ parte calores
> Austrinos tulerit, quæ terga obverterit axi,
> Restituant: adeo in teneris consuescere multum est. GEORG. ii.
>
> Beside, to plant it as it was, they mark
> The heav'n's four quarters in the tender bark;
> And to the north or south restore the side,
> Which at their birth did heat or cold abide:
> So strong is custom; such effects can use
> In tender souls of pliant plants produce.

Which monition, though Pliny and some others think good to neglect, or esteem indifferent, I can confirm from frequent losses of my own, and by particular trials, having sometimes transplanted great trees at Midsummer with success (the earth adhering to the roots) and miscarried in others, where the circumstance of aspect only was omitted.

To observe therefore the coast and side of the stock, especially of fruit trees, is not such a trifle as by some pretended; for if the air be as much the mother and nurse, as water and earth, as more than probable it is, such blossoming plants as court the motion of the meridian sun, do, as it were, evidently point out the advantage they receive from their position, by the clearness, politure, and comparative splendour of the south side; and the frequent mossiness of most trees on the opposite side, does sufficiently note the unkindness of that aspect, most evident in the bark of Oaks, white and smooth on trees growing on the south-side of an hill, while those which are exposed to the north, have an hard, dark, rougher, and more mossy integument, as I can now demonstrate in a prodigious coat of it investing some pyracanths which

BOOK I. I had removed to a northern dripping shade. I have seen (writes a worthy friend to me on this occasion) whole hedge-rows of apples and pears that quite perished after their shelter was removed; the good husbands expected the contrary, and that the fruit should improve, as freed from the predations of the hedge; but use and custom made that shelter neceſsary, and therefore, saith he, a stock for a time is the weaker, taken out of a thicket, if it be not well protected from all sudden and fierce invasions, either of crude air or winds. Nor let any be deterred, if, being to remove many trees, he shall esteem it too consumptive of time; for, with a brush dipped in any white colour, or oaker, a thousand may be speedily marked as they stand; and that once done, the difficulty is over. I have been the larger upon these two remarks, because I find them so material, and yet so much neglected[x].

8. There are other rules concerning the situation of trees; the former author commending the north-east wind, both for the flouriſhing of the tree, and advantage of the timber; but, to my observation, they thrive the best in those parts of our climate where those sharp winds do rather flanker than blow fully upon our plantations; and there are as well other circumstances to be considered, as they respect rivers, and marshes obnoxious to unwholesome and poisonous fogs, hills, and seas, which expose them to the weather, and those *Sylvifragi venti*, our cruel and tedious western winds; all which I leave to observation, because these accidents do so universally govern, that it is not easy to determine farther, than that the timber is commonly better qualified which hath endured the colder aspects without these prejudices. And hence it is that Seneca observes, wood most exposed to the winds to be the most strong and solid; and that therefore Chiron made Achilles's spear of a mountain tree[y] and of those the best, which grow thin, not much sheltered from the north. Again, Theophrastus seems to have special regard to places, exemplifying in many of Greece, which exceed others for good

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[x] When it is judged neceſsary to transplant trees of a large size, Mr. Evelyn's advice seems highly to be commended, though Mr. Miller treats it as chimerical. With smaller trees the caution is unneceſsary.

[y] From Pelion's cloudy top an Ash entire
Old Chiron fell'd and shap'd it for his sire. POPE.

timber, as, doubtleſs, do our Oaks in the forest of Dean all others of England: And much certainly there may reasonably be attributed to these advantages for the growth of timber, and of almost all other trees, as we daily see by their general improsperity, where the ground is a hot gravel, and a loose earth. An Oak or Elm in such a place, shall not, in an hundred years, overtake one of fifty, planted in a proper soil; though next to this, and, haply, before it, I prefer the good air.—Thus have they such vast junipers in Spain; and the Ash in some parts of the Levant (as of old near Troy) so excellent, as it was after mistaken for Cedar, so great was the difference from situation[s]; now the Cantabrian, or Spanish, exceeds any we have elsewhere in Europe.—And we shall sometimes, in our own country, see woods within a little of each other, and, to all appearance, growing on the same soil, where Oaks of twenty years growth, or forty, will, in the same bulk, contain their double in heart and timber; and that in one the heart will not be so big as a man's arm, when the trunk exceeds a man's body. This ought therefore to be weighed in the first plantation of copses, and a good eye may discern it in the first shoot; the difference proceeding, doubtleſs, from the variety of seed, and therefore great care should be had of its goodneſs, and that it be gathered from the best sort of trees, as was formerly hinted in the third section of the first chapter.

9. *Veterem arborem transplantare*, was said of a difficult enterprize: Yet before we take leave of this paragraph, concerning the transplanting of great trees, let us show what is poſsible to be effected in this kind, with cost and industry. Count Maurice, the late governor of Brasil for the Hollanders, planted a grove near his delicious paradise of Friburgh, containing six hundred Cocoa-trees of eighty years growth, and fifty feet high to the nearest bough; these he wafted upon floats and engines four long miles, and planted them so luckily that they bore abundantly the

[s] It appears very extraordinary that *situation* should make the *Ash* resemble the *Cedar*; but Mr. Evelyn aſserts this upon the authority of Pliny, who speaking of the Ash, says, "ea quidem, quæ fit in Ida Troadis, in tantum Cedro similis, ut ementes fallat, cortice ablato," Lib. xvi. Theophrastus, Lib. iii. cap. x. says, that the *Yew* (μίλος) growing near Troy, resembles the Cedar; so that Pliny must have been led into the above mistake by the similitude in sound between μίλος, the Yew, and μελία, the Ash.

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very first year, as Gasper Barlæus hath related in his elegant description of that Prince's expedition. Nor hath this only succeeded in the Indies alone; Monsieur de Fiat, one of the Mareschals of France, hath with huge Oaks done the like at Fiat. Shall I yet bring you nearer home? A great person in Devon, planted Oaks as big as twelve oxen could draw, to supply some defect in an avenue to one of his houses, as the Right Honourable the Lord Fitz-Harding, late Treasurer of his Majesty's Household, assured me, who had himself likewise practised the removing of great Oaks by a particular address, extremely ingenious, and worthy the communication.

10. Choose a tree as big as your thigh, remove the earth from about it, cut through all the collateral roots, till, with a competent strength, you can enforce it down upon one side, so as to come with your ax at the tap-root; cut that off, re-dress your tree, and so let it stand, covered about with the mould you loosened from it, till the next year, or longer if you think good, then take it up at a fit season; it will likely have drawn new tender roots apt to take, and sufficient for the tree, wheresoever you shall transplant it. Some are for laying bare the whole root, and then dividing it into four parts, in form of a cross, to cut away the interjacent rootlings, leaving only the cross and master-roots that were spared to support the tree; then, covering the pit with fresh mould, as above, after a year or two, when it has put forth, and furnished the interstices you left between the cross-roots with plenty of new fibres and tender shoots, you may safely remove the tree itself so soon as you have loosened and reduce the four decussated roots, and shortened the tap-roots; and this operation is done without stooping or bending the tree at all: And if, in removing it, you preserve as much of the clod about the new roots as possible, it would be much the better.

Pliny notes it as a common thing to re-establish huge trees which have been blown down, part of their roots torn up, and the body prostrate; and, in particular, speaks of a fir that, when it was to be transplanted, had a tap-root which went no less than eight cubits perpendicular. And to these I could super-add, by woeful experience, where some Oaks and other old trees of mine tore up with their fall and ruin, portions of earth, in which their former spreading roots were engaged, little less in bulk and height than some ordinary cottages built on the

common: Such havoc was the effect of the late prodigious hurricane. CHAP. III.
But to proceed. To facilitate the removal of such monstrous trees for the adornment of some particular place, or the rarity of the plant, there is this farther expedient: A little before the hardest frosts surprise you, make a square trench about your tree, at such distance from the stem as you judge sufficient for the root; dig this of competent depth, so as almost quite to undermine it, by placing blocks and quarters of wood to sustain the earth; this done, cast in as much water as may fill the trench, or at least sufficiently wet it, unleſs the ground were very moist before; thus let it stand till some very hard frost do bind it firmly to the roots, and then convey it to the pit prepared for its new station, which you may preserve from freezing by laying store of warm litter in it, and so close the mould the better to the straggling fibres, placing what you take out about your new guest to preserve it in temper; but in case the mould about it be so ponderous as not to be removed by an ordinary force, you may then raise it with a crane or pulley, hanging between a triangle made of three strong and tall limbs united at the top, where a pulley is fastened, as the cables are to be under the quarters which bear the earth about the roots; for by this means you may weigh up, and place the whole weighty clod upon a trundle, sledge, or other carriage, to be conveyed and replanted where you please, being let down perpendicularly into the place by the help of the foresaid engine: And by this addreſs you may transplant trees of a wonderful stature without the least disorder, and many times without topping, or diminution of the head, which is of great importance where this is practised to supply a defect, or remove a curiosity.

11. Some advise that, in planting of Oaks, &c. four or five be suffered to stand very near to one another, and then to leave the most prosperous when they find the rest to disturb its growth; but I conceive it were better to plant them at such distances as they may least incommode one another: For timber-trees, I would have none nearer than forty feet where they stand closest, especially of the spreading kind.

12. Lastly, Trees of ordinary stature transplanted, (being first well watered,) must be sufficiently staked and bushed about with thorns, to protect them from the concuſsion of the winds, and from the casual rubbing and poisonous brutting of cattle and sheep, the oilineſs of whose

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wool is also very noxious to them, till being well grown and fixed (which by seven years will be to some competent degree) they shall be able to withstand all accidental invasions but the ax; for I am now come to their pruning and cutting, in which work the seasons are of main importance.

13. Therefore, if you would propagate trees for timber, cut not off their heads at all, nor be too busy with lopping; but if you desire shade and fuel, or bearing of mast alone, lop off their tops, sear, and unthriving branches only. If you intend an outright felling, expect till November; for this premature cutting down of trees before the sap is perfectly at rest, will be to your exceeding prejudice, by reason of the worm, which will certainly breed in timber which is felled before that period; but in case you cut only for the chimney, you need not be so punctual as to the time; yet, for the benefit of what you let stand, observe the moon's increase, if you please. The reason of these differences is, because this is the best season for the growth of the tree which you do not fell, the other for the durableneſs of the timber which you do; now, that which is to be burnt is not so material for lasting, as the growth of the tree is considerable for the timber; but of these particulars more at large in chap. iii. book iii.

14. The very stump of an Oak, especially that part which is dry and above ground, being well grubbed, is many times worth the pains and charge for sundry rare and hard works; and, where timber is dear, I could name some who, abandoning this to workmen for their pains only, when they perceived the great advantage, repented of their bargain, and undertaking it themselves were gainers above half; I wish only, for the expedition of this knotty work, some effectual engine were devised, such as I have been told a worthy personage of this nation made use of, by which he was able, with one man, to perform more than with twelve oxen; and surely there might be much done by fastening of iron hooks and fangs about one root to extract another, the hook chained to some portable screw or winch[a]; I say such an invention might effect

[a] This wish is truly accomplished in the ERADICATOR invented by the Hon. Capt. Bentinck, and constructed by Mr. Cole, Engine-maker in London. The death of the ingenious inventor, at the time when the drawings were nearly completed, has deprived this work of one of its most useful ornaments.

wonders, not only for the extirpation of roots, but the prostrating of huge trees. That small engine, which by some is called the German Devil, reformed after this manner, and duly applied, might be very expedient for this purpose; but this is to be practised only where you design a final extirpation; for some have drawn suckers from an old stub root; but they certainly perish by the mofs which invades them, and are very subject to grow rotten. Pliny speaks of one root which took up an entire acre of ground, and Theophrastus describes the Lycean Platanus to have spread an hundred feet; if so, the argument may hold good for their growth after the tree is come to its period. They made cups of the roots of Oaks heretofore; and such a curiosity Athæneus tells us was carved by Thericleus himself; and there is a way so to tinge Oak, after long burying and soaking in water, which gives it a wonderful politure, as that it has frequently been taken for a coarse Ebony: Hence, even by floating, comes the Bohemian Oak, Polish, and other northern timber, to be of such excellent use for some parts of shipping: But the blackneſs which we find in Oaks that have long lain under ground (and may be called subterranean timber) proceeds from some vitriolic juice of the bed in which they lie, which makes it very weighty; but, as the excellent naturalists and learned physician, Dr. Sloane, observes, it dries, splits, becomes light, and soon impairs.

15. There is not in nature a thing more obnoxious to deceit than the buying of trees standing, upon the reputation of their appearance to the eye, unleſs the chapman be extraordinarily judicious, so various are their hidden and concealed infirmities till they be felled and sawn out; so, as if to any thing applicable, certainly there is nothing which does more perfectly confirm it than the most flourishing outside of trees; *fronti nulla fides*. A timber tree is a merchant adventurer,—you shall never know what he is worth till he be dead.

16. Oaks, in some places where the soil is especially qualified, are ready to be cut for copse in fourteen years, and sooner; I compute from the first semination. Though it be told as an instance of high encouragement, (and as indeed it merits) that a Lady in Northamptonshire sowed acorns, and lived to cut the trees produced from them twice in two and twenty years, and both as well grown as most are in sixteen or eighteen. This yet is certain, that acorns set in hedge-rows have,

BOOK I. in thirty years, borne a stem of a foot diameter. Generally, copse-wood should be cut close, and at such intervals as the growth requires, which, being seldom constant, depends much on the places and the kinds, the mould and the air; and for which there are extant particular statutes to direct us; of all which more at large hereafter. Oak for tan-bark may be felled from April to the last of June, by a statute in 1st Jacobi; and there are some for the disbarking of Oaks, and so to let them stand before they fell.

USES. 17. To enumerate now the incomparable uses of Oak were needless; but so precious was the esteem of it, that of old there was an express law amongst the twelve tables concerning the very gathering of the acorns, though they should be found fallen in another man's ground. The land and the sea do sufficiently speak for the improvement of this excellent material; houses and ships, cities and navies are built with it, and there is a kind of it so tough, and extremely compact, that our sharpest tools will hardly enter it, and scarcely the very fire itself, in which it consumes but slowly, as seeming to partake of a ferruginous and metalline shining nature, proper for sundry robust uses. It is doubtless, of all timber hitherto known, the most universally useful and strong; for though some trees be harder, as Box, Cornus, Ebony, and divers of the Indian woods, yet we find them more fragil, and not so well qualified to support great incumbencies and weights; nor is there any timber more lasting, which way so ever used. There has, we know, been no little stir amongst learned men, of what material the cross was made on which our blessed Saviour suffered: Venerable Bede, in Collectaneis, affirms it to have been framed of several woods, namely, Cypress, Cedar, Pine, and Box; And to confirm it, St. Hierom has cited Isaiah lx. 13. *Gloria Libani ad te veniet, et Buxus et Pinus simul ad ornandum locum sanctificationis meæ, et locum pedum meorum glorificabo;* but, following the version of the LXX, he reads, *Cupressus, Pinus, et Cedrus, &c.* Others insert the Palm, and so compose the cross of no less than four different timbers, according to the old verse:

> Quatuor ex lignis Domini crux dicitur esse.
> Pes crucis est Cedrus, corpus tenet alta Cupressus;
> Palma manus retinet, titulo lætatur Oliva.
>
> Nail'd were his feet to Cedar, to Palm his hands,
> Cypress his body bore, title on Olive stands.

And for this of the Palm, they fetch it from that of Cant. vii. 8. where it is said, *Aſcendam in Palmam, et apprehendam fructus ejus* [b], and from other allegorical and mysterious expreſsions of the sacred text without any manner of probability; whilst by Alphonsus Ciaconus [c], Lipsius, Angelus Rocca, Falconius, and divers other learned men, writing, on this subject, and upon accurate examination of the many fragments pretended to be parcels of it, it is generally concluded to have been the Oak; and I do verily believe it, since those who have described those countries aſsure us there is no tree more frequent, which, with relation to several celebrations and mysteries under Oaks in the Old Testament, has been the subject of many fine discourses. Nor is it likely they should choose or aſsemble so many sorts of woods, with that curiosity, to execute one upon whom they esteemed a malefactor; besides, we read how heavy it was, which Cypreſs, Cedar, and Palm are not in comparison with Oak; whilst Gretser denies all this, lib. i. cap. vi. and concludes, upon his accurate examination of several fragments yet extant, that it is not discernible of what timber it was framed. We might add, that the furious zeal of the bloody and malicious Jews to see our bleſsed Lord inhumanly executed, could not poſsibly allow leisure to frame a croſs of so many rare and curious materials; Let this therefore paſs for an errant legend [d].

That which is twined and a little wreathed (easily to be discerned by the texture of the bark) is best to support burthens, for posts, columns, summers, &c. for all which our English Oak is infinitely preferable to the

[b] The Septuagint has it more properly, "Ascendam in palmam, tenebo *cacumina* "ejus."

[c] In all the editions of the Silva, it is *Alphonsus Ciaconus*: But I know of no author of that name. I suppose that *A. Cocquius* is meant, who in 1664 wrote a book entiled, "Historia ac Contemplatio Sacra Plantarum, Arborum, et Herbarum, quarum sit mentio "in Sacra Scriptura." 4to.

[d] The whole of this seems an unneceſsary digreſsion. A superstitious Recluse might be allowed to waste his time in investigations of this nature; but a serious and practical Christian, in the humility of his soul, will content himself with the bare truth of the historical fact, as recorded in the books of the New Testament. *Tanta gentium in rebus frivolis plerumque Religio est.*——PLIN.

BOOK I.

French, which is nothing so useful, nor comparably so strong: insomuch as I have frequently admired at the sudden failing of most goodly timber to the eye, which, being employed to these uses, does many times most dangerously fly in sunder, as wanting that native spring and toughneſs which our English Oak is endued withal. And here we forget not the streſs which Sir H. Wotton, and other architects, put even in the very position of their growth, their native straightneſs and loftineſs for columns, supporters, croſs-beams, &c. and it is found that the rough-grained body of a stubbed Oak is the fittest timber for the case of a cyder-mill, and such like engines, as best enduring the unquietneſs of a ponderous rolling-stone. It is good for shingles, pales, laths, coopers' ware, clap-board for wainscot (the ancient *intestina opera* *—works within doors) and some pannels curiously veined, of much esteem in former times, till the finer-grained Spanish and Norway timber came amongst us, which is likewise of a whiter colour. There is in New England a certain red Oak which, being felled, they season in some moist and muddy place. This branches into very curious works. It is observed that Oak will not easily glue to other wood, nor very well with its own kind; and some woods will never coſiere tolerably, as the Box with Hornbeam, though both very hard; so, nor Service with Cornell, &c. Oak is excellent for wheel spokes, pins, and pegs for tyling, &c. Mr. Blyth makes spars and small building timber of Oaks of eleven years growth, which, is a prodigious advance. The smallest and straightest is best, discovered by the upright tenor of the bark, as being the most proper for cleaving; the knottiest for water-works, piles, and the like, because it will drive best and last longest; the crooked, yet firm, for knee-timber in shipping, mill wheels, &c[e]. In a word, how absolutely neceſsary the Oak is above all the trees of the forest in naval architecture, &c. consult Witsen, lib. i. cap. xiii.

* And therefore were joiners called Intestinarii. See Leg. ii. Cod. Theodos.

Were planting of this wood more in use, we should banish our hoops of hazel, &c. for those of good Copse-Oak, which, being made of the

[e] Every person who can measure timber thinks himself qualified to value standing trees; but such men are often deceived in their estimates. It is the perfect knowledge of the application of the different shaped trees that enables a man to be correct in his valuation. A foot of wood may be of little value to one trade, but of great value to another. This is the grand secret which enriches the purchasers of standing timber.

younger shoots, are exceedingly tough and strong; one of them being of Ground-Oak, will out-last six of the best ash; but this our coopers love not to hear of, who work by the great for sale, and for others. The smaller truncheons and spray, make billet, bavine, and coals; and the bark is of price with the tanner and dyer, to whom the very saw-dust is of use, as are the ashes and lee for bucking linen, and to cure the ropishneſs of wine: And as it is probable the cups of our acorns would tan leather as well as the bark, I wonder no body makes the experiment, as done in Turkey with the Valonia, which is a kind of acorn growing on the Oaks. The Ground-Oak, while young, is used for poles, cudgels, and walking-staffs, much come into mode of late, but to the waste of many a hopeful plant which might have proved good timber; and I the rather declaim against the custom, because I suspect they are such as are for the most part cut and stolen by idle persons, and brought up to London in great bundles, without the knowledge or leave of the owners, who would never have gleaned their copses for such trifling uses. Here I am again to give a general notice of the peculiar excellency of the roots of most trees, for fair, beautiful, chamleted, and lasting timber, applicable to many purposes; such as formerly made hafts for daggers, hangers, and knives, handles for staves, tobacco boxes, and elegant joiners' work, and even for some mathematical instruments of the larger size, to be had either in or near the roots of many trees; however, it is a kindneſs to premonish stewards and surveyors, that they do not negligently waste those materials: Nor may we here omit to mention tables for painters, which heretofore were used by the most famous artists, especially the curious pieces of Raphael, Durer, and Holbein, and before that of canvas, and much more lasting: To these add the galls, mistletoe, polypod, agaric, uvæ, and many other useful excrescences, to the number of above twenty, which doubtleſs discover the variety of transudations, percolations, and contextures of this admirable tree*; but of the several fruits, and animals generated of them and other trees, Franciſco Redi promises an expreſs treatiſe in his *Esperienze intorno alla Generazione de gl' Insetti*. Pliny affirms, that the galls break out altogether in one night, about the beginning of June, and arrive to their full growth in one day; this I should recommend to the experience of some extraordinary vigilant wood-man, had we any of our Oaks that produced them, Italy and Spain being the nearest that do. Galls are of several kinds, but grow upon a different species of Robur from any of ours, which are never

* Vide Johan. du Choul, de varia Quercus Historia.

BOOK I. known to bring these excrescences to maturity; the white and imperforated are the best; of all which, and their several species, see Casp. Bauhinus, and the excellent Malpighius, in his Discourse de Gallis, and other morbous tumours raised by, and producing insects, infecting the leaves, stalks, and branches of this tree with a venomous liquor or froth, wherein they lay and deposite their eggs, which bore and perforate these excrescences when the worms are hatched, so as we see them in galls[f].

What benefit the mast does universally yield, once in two years at least, for the fatting of hogs and deer, I shall show upon another occasion before the conclusion of this discourse. A peck of Acorns a day, with a little bran, will make a hog, it is said, increase a pound weight per diem for two months together. They give them also to oxen, mingled with bran, chopped or broken; otherwise they are apt to sprout and grow in their bellies[g]. Others say they should first be mascerated in water to extract their malignity, cattle many times perishing without this preparation. Cato advises the husbandman to reserve two hundred and forty bushels of acorns for his oxen, mingled with a like quantity of beans and lupines, and to drench them well. But, in truth, they are more proper for swine, and, being so made small, will fatten pigeons, peacocks, turkeys, pheasants, and poultry; nay, it is reported that some fishes feed on them, especially the tunny, in such places of the coast where trees hang over arms of the sea. Acorns, before the use of wheat

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[f] Linnæus, Geoffroy, Scopoli, and Schæffer have given us very minute descriptions of the different kinds of insects that deposite their eggs upon the leaves of the Oak, Alder, Willow, Poplar, &c.

> ——————The flowery leaf
> Wants not its soft inhabitants. Secure,
> Within its winding citadel, the stone
> Holds multitudes. But chief the forest-boughs,
> That dance unnumber'd to the playful breeze,
> The downy orchard, and the melting pulp
> Of mellow fruit, the nameless Nations feed
> Of evanescent Insects. THOMSON.

[g] The food taken in by ruminant animals does not remain long enough in the stomach and intestinal canal to occasion the germination of acorns, mast, or any kind of seed. And even if such a luxuriancy of vegetation should take place, still no bad consequences could possibly arise from it.

corn was found out, were heretofore the food of men, nay, of Jupiter himself, as well as other productions of the earth, till their luxurious palates were debauched: and even in the time of the Romans, the custom was in Spain, to make a second service of acorns and mast, as the French now do of marrons and chesnuts, which they likewise used to roast under the embers:

——————et quernâ glande repasta
Equaſse annosas vivendo corpora quercus.

——————Fed with the oaken mast,
The aged trees themselves in years surpaſs'd.

And men had indeed hearts of Oak; I mean, not so hard, but health and strength, and lived naturally, and with things easily parable and plain.

Fælix illa ætas mundi, justiſsima Nymphe,
Cum dabat umbra domum vivam tua, cùm domus ipsa
Deciduâ dominos pascebat fruge quietos,
Soláque præbebant sylvestria poma secundas
Gramineis epulas mensis; nondum arte magistra
Arbor adulteriis prætulerat insita nostris. COULEII Pl. l. vi.

Blest age o' th' world, just nymph, when man did dwell
Under thy shade whence his provision fell;
Salads the meal, wildings were the desert;
No tree yet learned, by ill example, art,
With insititious fruit, to symbolize,
As in an emblem, our adulteries.

Thus the sweet poet bespeaks the Dryad. But it is in another place* where I show you what this acorn was. And even now I am told, that those small young acorns which we find in the stock-doves' craws are a delicious fare, as well as those incomparable salads, young herbs taken out of the maws of partridges at a certain season of the year, which gives them a preparation far exceeding all the art of cookery.— Oaks bear also a knur, full of a cottony matter, of which they antiently made wick for their lamps and candles; and among the *Selectiora Remedia* of *Jo. Prævotius*, there is mention of an oil *è querna glande* chymically extracted, which he affirms to be of the longest continuance, and least consumptive of any other whatsoever for such lights, *ita ut uncia singulis mensibus vix absumatur continuo igne.* The ingenious author

* Ch. i. B. iv.

BOOK I. of the Description of the Western Isles of Scotland tells us, that, upon his own experience, a rod of Oak, of four, five, six, or eight inches about, being twisted like a wyth, boiled in wort, well dried, and kept in a little bundle of barley-straw, and then steeped again in wort, causes it to ferment, and procures yeast. The rod should be cut before mid-day, and is frequently used in this manner to furnish yeast, and, being preserved, will serve, and produce the same effect many years together; and, as the historian affirms, that he was showed a piece of thick wyth which had been kept for making ale with for above twenty years[h]. In the mean time, the leaves of Oaks abundantly congested on snow, preserve it as well, for wine, as a deep pit, or the most artificial refrigeratory. Nor must we pass by the sweet meldews, so much more copiously found on this tree than any other, whence the industrious bees gather such abundance of honey, as that, instead of carrying it to their hives, they glut themselves to death: But, from this ill report, hastily taken up by Euricius Cordus, our learned Mr. Ray has vindicated this temperate and abstemious useful creature. Varro affirms they made salt of Oak ashes, with which they sometimes seasoned meat, but more frequently made use of it to sprinkle among, and fertilize their seed-corn; which minds me of a certain Oak, found buried somewhere in Transylvania, near the salt-pits, that was entirely converted into an hard salt when they came to examine it by cutting. This experiment, if true, may possibly encourage some other attempts for the multiplying of salt. Nor less strange is that which some report of a certain water, somewhere in Hungary, which transmutes the leaves of this tree into brass, and iron into copper[i]. Of the galls is made trial of spaw-water,

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[h] It is a practice in some parts of this country to dry yeast upon cap-paper, placed in a wicker basket, in order that the ale may filtre through. A small portion of this dried cake, beaten up with warm water and a little pot-ash, makes an extemporaneous ferment for bread.

[i] Brass is a factitious metal, and never discovered in a natural state; so that what Mr. Evelyn here says must be regarded as fabulous. With respect to what he mentions of iron being converted into copper, there is the appearance of truth in the experiment. In Ireland there is a spring, in which, if plates of iron are laid, they will be converted, in a few weeks, into copper: But in this case there is a fallacy, and no real transmutation. The particles of iron are corroded by the acid in the water, and the particles of the copper, minutely suspended in the menstruum, are deposited in their place. In this manner considerable quantities of copper are collected.

and the ground and basis of several dyes, especially sadder colours, and are a great revenue to those who have quantities of them. Nor must I forget ink, composed of galls ℥iiij, copperas ℥ij, gum arabic ℥i; beat the galls grofs, and put them into a quart of claret or French wine, and let them soak for eight or nine days, setting the vefsel (an earthen glazed pitcher is best) in the hot sun, if in summer, but in winter near the fire, stirring it frequently with a wooden spatula; then add the copperas and gum; and after it has stood a day or two it will be fit to use. There are a world of receipts more, of which see Caneparius *de Atramentis*.— Of the very mofs of the Oak, that which is white composes the choicest cypref-powder, which is esteemed good for the head; but impostors familiarly vend other mofses under that name, as they do the fungi (excellent in hæmorrhages and fluxes) for the true agaric, to the great scandal of physic. Young red oaken leaves, decocted in wine, make an excellent gargle for a sore mouth; and almost every part of this tree is sovereign against fluxes in general, and where astringents are proper. The dew that impearls the leaves in May, insolated, meteorizes, and sends up a liquor which is of admirable effect in ruptures. The liquor iffuing out between the bark, which looks like treacle, has many sovereign virtues. And some affirm the water stagnate in the hollow stump of a newly-felled Oak is as effectual as *lignum sanctum* in the foul disease, and also stops a diarrhœa. A water distilled from the acorns is good against the phthisic and stitch in the side; it heals inward ulcers; breaks the stone, and refrigerates inflamations, being applied with linen dipt therein: Nay, the acorns themselves, eaten fasting, kill the worms, provoke urine, and, some affirm, break even the stone itself. The coals of Oak, beaten and mingled with honey, cure the carbuncle. We shall say nothing of the viscuses, polypods, and other excrescences, of which innumerable remedies are composed, noble antidotes, syrups, &c.— Nay, it is reported, that the very shade of this tree is so wholesome, that the sleeping, or lying under it, becomes a present remedy to paralytics, and recovers those whom the mistaken malign influence of the Walnut-tree has smitten[k]. But what is still more strange, I read in one Paulus,

[k] The ancients, who were fond of refreshing themselves under the shade of trees, caution us against the influence of the Walnut. Pliny says of its shade, "gravis et noxia, etiam capiti humano, omnibusque juxta satis." Lib. xvii. c. xviii.

BOOK I.

a physician of Denmark, that a handful or two of small Oak buttons, mingled with oats, and given to horses which are black, will, in a few days eating, alter their colour to a fine dapple grey; and this he attributes to the vitriol abounding in this tree[1].

To conclude, upon serious meditation of the various uses of this and other trees, we cannot but take notice of the admirable mechanism of vegetables in general, as in particular in this species, that, by the diversity of percolations, and strainers, and by mixtures, as it were of divine chymistry, various concoctions, &c. the sap should be so green on the indented leaves, so lustily esculent for hardier and rustic constitutions in the fruit; so flat and pallid in the atramental galls; and, haply, so prognostic in the apple; so suberous in the bark; (for even the cork-tree is but a coarser Oak;) so ouzy in the tanner's pit; and, in that subduction, so wonderfully specific in corroborating the entrails and bladder, reins, loins, back, &c. which are all but the gifts and qualities, with many more, that these robust sons of the earth afford us; and that, in other specifics, even the most despicable and vulgar Elder imparts to us in its rind, leaves, buds, blofsoms, berries, ears, pith, bark, &c. which hint may also carry our remarks upon all the varieties of shape, leaf, seed, fruit, timber, grain, colour, and all those other forms that philosophers have enumerated; but which were here too many for us to repeat.

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[1] The wood contains no vitriol; neither ought any credit to be given to the experiment. Virgil in the fourth Eclogue mentions something of the same kind, but it should be considered that he there speaks as a poet, and not as as a philosopher:

Nec varias discet mentiri lana colores:
Ipse sed in pratis aries jam suave rubenti
Murice, jam croceo mutabit vellera luto:
Sponte sua sandyx pascentes vestiet agnos.

The common Elm Tree.

J. Miller del et Sc

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CHAP. IV.

The ELM[m].

1. ULMUS, the ELM. Of this there are four or five sorts, and, from the difference of the soil and air, divers spurious: Two of these kinds are most worth your culture, viz. the Vulgar, or Mountain Elm, which is taken to be the Oriptelea of Theophrastus, being of a leſs jagged and smaller leaf; and the Vernacula, or French Elm, whose leaves are thicker and more florid, glabrous, and smooth, delighting in the lower

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[m] The Elm is the next tree that offers itself to our observation: and it deserves this place, whether we consider its beauty when growing, or its uſefulneſs when felled. The Wych Elm, or Ulmus Campestris, is the only species that grows in Great Britain, the rest being varieties.

1. ULMUS *(CAMPESTRIS)* foliis duplicato serratis; basi inæqualibus. Lin. Sp. Pl. 327.—*Elm with leaves doubly sawed on their edges, and unequal at their base.* Ulmus vulgatiſsima, folio lato, scabro. Ger. Emac. 1480. *The Common Elm, with a broad rough leaf.* THE WYCH ELM.

The Wych Elm is very common in the north-west counties of England, where it grows to a very large size, and is generally believed to grow naturally in the woods. The bark of the young branches is smooth and very tough, but that of the old trees cracks and is rough. The branches spread, and do not grow so erect as those of the small-leaved, or English Elm.—The leaves are rough, and are doubly sawed on their edges. Their base is unequal, about three inches long and two broad, of a dark green colour, and stand upon short foot-stalks.—The flowers come out in March upon the slender twigs, standing in clusters; they are of a deep red colour; these are succeeded by oval bordered capsules, containing one roundish compreſsed seed, which ripens in May. The wood of this tree is good for all the purposes of any kind of Elm; but the leaves do not come out till late in the spring, so there are few persons who plant these trees near their habitations. The five following are varieties.

ULMUS *(SCABRA)* foliis oblongo ovatis inæqualitur serratis, calycibus foliaceis. *Elm with oblong oval leaves which are unequally sawed, and have leafy empalements to the flowers.* Ulmus folio latiſsimo, scabro. Ger. Emac. 1481. *Elm with a rough and very broad leaf.* THE WYCH HAZEL.

This sort grows naturally in some of the northern counties of England, where it is called Wych Hazel, from the resemblance that the young shoots and leaves bear to those of Hazel.—It grows to a tree of great magnitude. The bark of the young shoots is very smooth and tough; it is of a yellowish brown colour, with spots of white. The leaves are oval, six

BOOK I. and moister grounds, where they will sometimes rise to above an hundred feet in height, and a prodigious growth, in leſs than a person's age; myself having seen one planted by the hand of a Counteſs, living not long since, which was near twelve feet in compaſs; and of an height proportionable, notwithstanding the numerous progeny which grew under the shade of it, some whereof were at least a foot in diameter,

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inches long, and almost four broad, and are unequally sawed on their edges. The flowers grow in clusters towards the end of the twigs; they have long leafy empalements of a green colour, and appear in the spring before their leaves, and the seeds ripen the latter end of May. Formerly, when long bows were in use, many of them were made of the boughs of this tree.

ULMUS *(SATIVA)* foliis ovatis acuminatis duplicato-serratis, basi inæqualibus. *Elm with oval acute-pointed leaves, which are doubly sawed, and unequal at their base.* Ulmus minor, folio angusto, scabro. Ger. Emac. 1480. *THE SMALL LEAVED, or ENGLISH ELM.*

This kind is commonly known in the nursery-gardens by the title of English Elm, which is far from being a right appellation; for it is not a native of England, and is only found growing near London, or in plantations where the young trees were procured from the neighbourhood of London. Where this tree grows naturally, it is not easy to determine; some persons suppose it was brought from Germany. The flowers are of a purplish red colour, and generally appear about the middle of March; but Mr. Miller could never observe any seeds upon this sort. It is by some called the Cornish Elm.

ULMUS *(GLABRA)* foliis ovatis glabris, acutè-serratis. *Elm with oval smooth leaves, which are sharply sawed on their edges.* Ulmus folio glabro. Ger Emac. 1481. *THE SMOOTH-LEAVED ELM.*

This is very common in several parts of Hertfordshire, Eſsex, and other north-east counties of England, where it grows to a large tree, and is much esteemed. The branches spread out like those of the first sort. The leaves are oval, and sharply sawed on their edges; they are smoother than most of the other sorts, and do not appear till the middle or latter end of May, so that this kind is seldom planted near habitations.

ULMUS *(HOLLANDICA)* foliis ovatis acuminatis rugosis, inæqualiter serratis, cortice fungoso. *Elm with oval, acute-pointed, rough leaves, which are unequally sawed, and a fungous bark.* *THE DUTCH ELM.*

This sort is well known by the title of Dutch Elm. It was brought from Holland about the beginning of the reign of King William, and was employed in forming hedges in gardens; but that taste being now justly exploded, the tree is no longer noticed in this country.

ULMUS *(MINOR)* foliis oblongo-ovatis glabris acuminatis duplicato-serratis. *Elm with oblong, smooth, acute-pointed leaves, which are doubly sawed.* Ulmus minor, folio angusto, glabro. *Elm with smooth narrow leaves.* *THE UPRIGHT ELM.*

that, for want of being seasonably transplanted, must needs have hindered the procerity of their ample and indulgent mother.

2. For though both these sorts are raised of appendices or suckers, as anon we shall describe, yet this latter comes well from the *samera*, or seeds, and therefore I suppose it to be the ancient *Atinia;* for such

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This is found growing in hedge-rows in several parts of England. The branches have a smooth greyish bark, and grow erect. The leaves are narrower, and more pointed than those of the English Elm, and are smoother; they are later in coming out in the spring than those, but continue longer in autumn.

ULMUS *(AMERICANA)* foliis æqualiter serratis; basi inæqualibus. Sp. Pl. 327. Ulmus fructu membranaceo, foliis simpliciſsimè serratis. Gron. Virg. 145. *THE AMERICAN ELM.*

This species grows plentifully about Fort Anne, in North-America, of which there are two kinds, the white and the red. Of the bark of the former boats are made.

The ELM is stationed in the claſs and order *Pentandria Digynia*, there being in each flower five stamina and two styles. The flowers are in full bloom about the beginning of April, and the leaves open about the middle of the same month; but the seeds do not ripen before the beginning of June.

Of this tree there are many varieties which are preserved in the nursery-gardens, but their difference is not remarkable enough to deserve notice; they are therefore omitted, as are also those with variegated leaves, of which there are several sorts propagated in the nurseries about London.

Elms are propagated by layers, by seeds, and by grafting on their own kind.

In order to propagate them by layers, proper stools for the purpose must be first obtained; to procure which, let a piece of good ground be double dug, and let Elms of about for or five feet high be planted in it, at the distance of about ten feet: If they make good shoots in the first year, they may be cut down early the spring following; if not, they should remain two years before they are headed for stools; which should be done by cutting them down to within half a foot of the ground. After they are cut down they thould be suffered to grow undisturbed for two years: The ground between the stools must be dug in the winter, and constantly hoed as the weeds arise in the summer; and at the end of that time, that is two years, the branches growing from these stools will be fit for layering, which may be performed thus: Open a piece of ground wide enough to receive a whole branch, and let the hollow be about half a foot deep; then splash the branch with a knife, near the body of the stool, that its head may be more readily brought into the prepared place: Next, thrust an hooked stick into the ground to hold it down; take off all the superfluous branches which croſs, and would otherwise incommode those that are to be continued: After this, slit all the remaining young branches half-way through, turning the edge of the knife towards the extremity of the branch. When this is done the mould should be gently put amongst them, and they

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an Elm they acknowledge to be raised of seeds, which, being ripe about the beginning of May, though frequently not till the following month, will produce them; as may be seen abundantly in the gardens of the Thuilleries, and that of Luxembourg, at Paris, where they usually sow themselves, and come up very thick; and so do they in many places of our country, though so seldom taken notice of, as that it is esteemed

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should have all their ends bent towards the stool, that the slit may be kept open. Lastly, having the whole vacuity filled with its own mould, smooth and even, take off the end of each twig that peeps above the ground, down to one eye; and the branch, thus laid, will afford as many plants as there are buds peeping out of the ground. Proceed in like manner to the other branches of the same stool, then to the next stool in order, and so on until the whole business of layering be finished.

By the autumn following, these layers will have taken root, and many of them will have made a shoot of near a yard in length. It is then necessary to take them from their stools, and plant them in some double-dug ground in the nursery. They should be set in rows three feet asunder, and the distance allowed them from each other in the rows ought to be a foot and a half. Here they may stand till they are planted out where they are to remain, with no farther trouble than digging the ground between the two rows every winter, and, in the same summer, carefully watching those which shoot out two branches at the head, and nipping the weakest of them off.

After the layers are taken up, the stools must have all the wounded parts, occasioned by the former splashing, taken away; the old branches also should be cut off pretty close to the stem, and in the spring they will begin to shoot out fresh branches again for a second layering, which will likewise be ready to have the same operation performed the second year after: And thus may this layering be performed on these stools every other year. But nurserymen, who must raise great quantities of trees this way, should be provided with two quarters of stools, to come in alternately, so that from one or other of them they may annually receive a crop.

Another, and by far the most expeditious method of raising Elms, is by sowing the seeds; but this practice chiefly respects the Wych Elm, the seeds of the others very rarely ripening in this country. In order, therefore, to obtain a good quantity of these Elms, let the seeds be gathered the beginning of June, it being the time when they are full ripe. When gathered, spread them three or four days to dry; for, if they were to be sown immediately upon being gathered, they would rot. Having been spread about that time, and the ground, which ought to be fresh and good, being in readiness for their reception, mark out your beds four feet wide, and let the alleys between them be a foot and an half or two feet broad. Rake the mould out of the beds until they are about an inch deep; riddle that which came out of the beds into them again, until the bottom of each bed be raised half an inch (*i. e.* half filled) with riddled mould; then gently press the mould down with the back of the spade, and sow the seeds thinly all over it with an even hand, covering them down with fine earth about half an inch deep. When the seeds are all sown this way, the beds should be hooped and covered with mats, to shade the plants

a fable by the leſs observant and ignorant vulgar: Let it therefore be tried in season, by turning and raking some fine earth, often refreshed, under some amply spreading tree; or to raise them of their seeds, being well dried a day or two before, sprinkled on beds prepared of good loamy fresh earth, and sifting some of the finest mould thinly over them, and watering them when need requires: Being risen, which

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during the hot season; and they should also sometimes be refreshed with water: Part of the young plants will come up in about a month, or sooner; the others not till the spring following. From the time the seeds are sown to their appearance above ground, whenever rain falls, be careful to uncover the beds, and be as ready to cover them again when the scorching beams of the sun break out. About the end of August, the mats should be wholly taken away, that the plants may be hardened against winter: The spring following, a fresh crop will present themselves among those that came up the summer before: All the summer following they should be constantly kept free from weeds, and watered as often as dry weather shall render it neceſsary; and in October, or spring, they may be planted out in the nursery, at the distance before prescribed for the layers, and afterwards should be managed like them.

Grafting is the next method of propagating Elms, all the sorts of which may be increased this way: The stocks for the purpose should be the common broad-leaved, or Wych Elm, which must be raised from the seed, and planted out as before. When they have grown two years in the nursery they will be of proper size to receive the graft; the beginning of March is the best time for the work. If a large quantity of Elm stocks are to be grafted, procure six men in readineſs for the purpose: The buſineſs of the first man is to take the mould from the stem of the stocks, with a spade, down to the root, laying the top of the root bare; the next man is to follow him with a sharp pruning-knife, cutting off the heads of the stocks, and leaving the stumps to be grafted only about two inches above the root; the third man is the grafter himself, who, having his grafts cut about four or five inches in length, all of the young wood, and such as have never bore lateral branches, in a dish, takes out one of them, and, holding it in his left hand, the taper end being from him, with the knife that is in his right, he takes off a slope, about an inch and an half, or two inches long; and, if the grafter be an artist, it will be cut as true as if wrought by a plane. This done, he forms a tongue by making a small slit upwards, beginning from the top of the slope, and then proceeds to prepare the stock to receive it, which is effected by sloping off a side of it, of the same length with the sloped graft, that the parts may fit as near as poſsible: He then makes a cut, nearly at the top of the stock, downward, to receive the tongue he had made in the graft; and, having properly joined them, he proceeds to the next. After the grafter, follows a person with baſs matting, cut into proper lengths; and, with these, he ties the grafts pretty close to the stock. The fifth man brings the clay, which should have been prepared a week, or longer, before, and well worked and beaten over, mixed with a fourth part of horse-dung, and some chopped hay, in order to make it hang the better together; with this he surrounds the graft and the stock. Lastly, the sixth man comes and closes the clay.

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may be within four or five months, an inch above ground, refreshed and preserved from the scraping of birds and poultry, comfort the tender seedlings by a second sifting of more fine earth to establish them; thus keep them clean weeded for the first two years, cleansing the side-boughs; or, till being of fitting stature to remove into a nursery at wider intervals, and even rows, you may thin and transplant them in the same

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Two or three rows being grafted, let an additional hand or two be employed, either in drawing the earth up above the clay, that it may be wholly covered, or digging the ground between the rows, and levelling it, so that nothing of the performed work may appear, except the tops of the grafts, above ground. The danger of frost renders this precaution highly necefsary; for, if it should be delayed a night or two, and sharp frosts should happen, the clay will be apt to fall off; and thus the work will require to be repeated; whereas, when it is lapped warm in the manner directed, there will be no danger of such an accident.

A good workman, with the above-mentioned necefsary afsistance, will graft about a thousand stocks in a day. In the spring, the buds will swell, disclose, and shoot forth nearly as soon as those of the tree from which they were taken. By the latter end of June they will have shot a foot, or about a foot and a half; when they should be freed from the clay, and the matting taken off. At this time, of those which have put forth two shoots, the weakest should be taken off, to strengthen the other, and to lighten the head, which would otherwise be subject to be broken off by high winds. By autumn the shoot will have grown about a yard in length; and, in the winter, the ground should be dug between the rows.

In this place the plants may remain till they are of a sufficient size to be planted out for continuance, with no other trouble than what was directed for the layers; namely, keeping them clear of weeds and digging between the rows in the winter; at the same time taking off all very large side-branches; and, in the summer, pinching off such young shoots, in the head, as may have a tendency to make the tree forked.

This practice of grafting will be found a valuable improvement of the English Elm, if we consider the nature of the Wych Elm, on which it is grafted. First, the Wych Elm not only grows to the largest size of all the sorts, but also grows the fastest. However, this is not to be wondered at, if we examine the root, which we shall find more fibrous than in any of the other Elms. Now, as all roots are of a spongy nature, to receive the juices of the earth for the nourishment and growth of the tree, that tree must necefsarily grow the fastest whose root is most spongy and porous; and therefore the English Elm, when set upon the root of the Wych, will draw from the earth a greater quantity of nutriment. The English Elm, on this basis, will arrive at timber many years sooner than when raised by layers, and be also forced to a greater size.

All kinds of Elms, the Wych excepted, are proper to plant in hedge-rows, upon the borders of fields, where they will thrive much better than when planted in a wood, or close plantation, and their shade will not be very injurious to whatever grows under them; but when these trees are transplanted out upon banks after this manner, the banks

manner as you were directed for your young Oaks; only they shall not need above one cutting, where they grow lefs regular and hopeful. But because this is an experiment of some curiosity, obnoxious to many casualties, and that the producing them from the mother-roots of greater trees is very facile and expeditious, besides the numbers which are to be found in the hedge-rows and woods, of

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should be well wrought, and cleared from all other roots, otherwise the plants, being taken from a better soil, will not make much progrefs in these places. Michaelmas is a good time for this work; but when planted, they should be staked to prevent their being displaced by the winds, and part of their heads should be taken off before they are planted, which will be of use in preventing their being easily overturned by winds; but by no means should their leading shoot be stopped, nor the branches too closely cut off; for if there are not some shoots left on to draw and attract the sap, they will be in danger of miscarrying.

These trees are also proper to plant at a distance from a garden or building, to break the violence of the winds, for which purpose there is not any tree more useful; for they may be trained up in form of a hedge, keeping them cut every year, which will cause them to grow very close and handsome to the height of forty or fifty feet, and be a great protection against the fury of winds; but they should not be planted too near a garden, where fruit-trees or other plants are placed, because the roots of the Elms run superficially upon the ground to a great distance, and will intermix with the roots of other trees, and deprive them of nourishment; nor should they be planted near gravel or grafs walks, which are designed to be well kept, because the roots will run into them, and send forth suckers in great plenty, which will deface the walks, and render them unsightly. It must however be considered, that by grafting the English Elm upon the Wych stock, the inconveniences from the spreading of the roots will be removed.

The Elm may be removed when grown to a considerable size; so that a person who is willing to have his plantations for shade in a short time, may procure trees of near one foot circumference in their trunk, which will be in little danger of miscarrying, provided they are removed with care: And these will take root, and grow very well, though not so well as young plants, which is what few other sorts of trees will do; but then they should be such trees as have been regularly trained in a nursery, and have good roots, and not such as are taken out of hedge-rows, (as is by some practised,) which seldom rise with any tolerable roots, and consequently often miscarry; and this has been the occasion of so many plantations of these trees failing; for although some of them may live a few years, yet few of them are of a long duration, and they rarely increase much in their stems; but frequently grow hollow, their heart decaying first, so that they are supported only by their bark or shell, for a few years, and the first severe winter, or very dry summer, generally destroys them.

Although I have said that Elms, which are trained up in a nursery, may be removed with safety, at a larger size than most other trees, yet I would not have it understood, that by this I would recommend the planting of them when large; for if people would

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3. The suckers which I speak of are produced in abundance from the roots, whence, being dexterously separated, after the earth has been well loosened, and planted about the end of October, they will grow

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have a little patience when they plant, and never plant any of these trees which are more than four or five inches in the girt of the stem, they would in a few years, have better trees than if they had put down such as were of a larger size; besides, small trees are much more easily removed, and do not require to be so strongly supported, nor is there much danger of their miscarrying; therefore it is much more eligible to make choice of young thriving trees, and never to plant any large ones, unless where a small number may be wanted for an immediate shade.

In planting of Elms, great care must be taken not to bury their roots too deep, which is very injurious to them, especially if they are planted on a moist loam or clay; in which case, if the clay be near the surface, it will be the best way to raise the ground in a hill, where each tree is to be planted, which will advance their roots above the surface of the ground, so that they will not be in danger of rotting in winter from too much moisture.

The Wych Elm is by no means proper to plant in hedge-rows or open fields, as it throws out monstrous large arms, on which account it is not so beautiful as the English Elm: Few of these therefore should be planted, unless it be to make a contrast with the others. This tree, however, is very proper to be planted for woods; for, being near each other, they will aspire like the Oak; no great arms will be produced, but a clear noble trunk will present itself to a great height.

Whoever is desirous of having an *Ulmarium*, or wood of these Elms, must raise the plants in the seminary, as before directed, and afterwards plant them in the nursery. The rows need not be wider than two feet, nor the plants above a foot asunder, if ground is scarce, as they must be soon taken from hence to form the wood: When they are about three or four feet high, they will be of a proper size for this purpose. The ground should be made ready for their reception, which I would advise to have done by double digging; but, if this should be thought too expensive, and the plantation is designed to be very large, let it be ploughed very deep with a very strong plough, that the turf, or rich soil, may be worked down, in order to receive the roots of the plants when they strike. This being done, make the holes all over the ground; and as these trees are not so large as those planted for standards, they need not be so wide; a foot and a half will be sufficient. If the best mould, designed to lap the roots in, is not very pliable or fine, it will be proper to let the holes remain open some time, and the mould must be exposed to the sun, rain, and frost, which will greatly mellow it, and render it fitter for the purpose.— The distance of these holes should be two yards. Having taken the trees out of the nursery, cut off all large lateral branches, and shorten the side-shoots in proportion to the root; and, having also taken off all the bruised parts of the roots, proceed to plant them. After this, they will require no farther care till their branches begin to touch one another;

very well; nay, the stubs only, which are left in the ground after a felling, being fenced in as far as the roots extend, will furnish you with plenty, which may be transplanted, from the first year or two succeſsively, by slipping them from the roots, which will continually supply you for many years, after that the body of the mother-tree has been cut down: And from hence probably is sprung that (I fear) mistake of Salmasius and others, where they write of the growing of their chips (I suppose having some of the bark on) scattered in hewing of their timber; the error proceeding from this, that, after an Elm-tree has been felled, the numerous suckers, which shoot from the remainders of the latent roots, seem to be produced from this dispersion of the chips: Let this yet be more accurately examined; for I pronounce nothing magisterially, since it is so confidently reported.

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when they should be thinned, by taking away every second, or rather the leſs-thriving trees, all over the plantation. Thus they may continue until the branches meet again, when they should undergo a second thinning, taking care to grub up the old roots. When managed in this manner, the trees will become noble, lofty, and valuable.

Columella, in his twelfth chapter *de Arboribus*, informs us, that Elms were principally employed in making living props to vines; and that vineyards, formed upon this extensive plan, were named *Arbusta*, the vines themselves being called *Arbuſtivæ Vites*, to distinguish them from others raised in more confined situations. Since the introduction of silk-worms into Italy, the Mulberry trees in many places, are pollarded for the double purpose of supporting vines, and supplying leaves for feeding the worms. Once in two years the Elms were carefully pruned, to prevent their leaves from overshadowing the grapes; and this operation was deemed of great importance. Corydon is reproached for a double neglect, in suffering both his Elms and Vines to remain unpruned:

> Semiputata tibi frondosa vitis in ulmo est. ECL. ii. 70.

Virgil, in his elegant description of the implements of husbandry, recommends the *buris*, or plough-tail, to be made of an Elm bent in the woods:

> Continuo in sylvis magna vi flexa domatur
> In burim, et curvi formam accipit Ulmus aratri. GEORG. i. 170.

From this paſsage, it is probable that the hint was taken of forming knee-timber by bending down young Oaks.

Among the antients, it was customary to plant about their tombs such trees as bore no seeds, particularly the Elm:

> Jove's Silvan daughters bade their Elms bestow
> A barren shade, and in his honour grow. POPE'S HOMER, vi. 530.

BOOK I.

4. I have known stakes, sharpened at the ends for other purposes, take root familiarly in moist grounds, and become trees; and divers have esayed, with extraordinary succes, the trunchions of the boughs and arms of Elms, cut to the scantling of a man's arm, about an ell in length: These must be chopped on each side opposite, then laid into trenches about half a foot deep, and covered about two or three fingers deep with good mould. The season for this work is towards the exit of January, or early in February, if the frosts impede not; and, after the first year, you may cut or saw the trunchions off in as many places as you find cause, and as the shoots and rooted sprouts will direct you for transplantation. Another expedient for the propagation of Elms is this: Let trenches be sunk at a good distance, viz. twenty or thirty yards from such trees as stand in hedge-rows, and in such order as you desire your Elms should grow: Where these gutters are, many young Elms will spring from the small roots of the adjoining trees. Divide, after one year, the shoots from their mother-roots, which you may dexterously do with a sharp spade, and these, transplanted, will prove good trees without any damage to their progenitors. Or do thus: Lop a young Elm, the lop being about three years growth; do it in the latter end of March, when the sap begins to creep up into the boughs, and the buds are ready to break out; cut the boughs into lengths of four feet slanting, leaving the knot where the bud seems to put forth in the middle: Inter these short pieces in trenches of three or four inches deep, and in good mould well troden, and they will infallibly produce you a crop; for even the smallest suckers of Elms will grow, being set when the sap is newly stirring in them. There is yet a fourth way, no les expeditious, and frequently confirmed with excellent succes: Bare some of the master-roots of a vigorous tree within a foot of the trunk, or thereabouts, and with your ax make several chops, putting a small stone into every cleft to hinder the closure, and give acces to the wet; then cover them with three or four inches of earth, and thus they will send forth suckers in abundance; I asure you, one single Elm, thus well ordered, is a fair nursery, which, after two or three years, you may separate and plant in the *Ulmarium*, or place designed for them; and which, if it be in plumps, as they call them, within ten or twelve feet of each other, or in hedge-rows, it will be better; for the Elm is a tree of consort, sociable, and so affecting to grow in company, that the very best which I have ever seen do almost touch one another: This also

protects them from the winds, and causes them to shoot of extraordinary height, so as, in little more than forty years, they arrive to a load of timber, provided they be sedulously and carefully cultivated, and the soil propitious; for an Elm does not thrive so well in the forest, as where it may enjoy scope for the roots to dilate and spread at the sides, as in hedge-rows and avenues, where they have the air likewise free.— Note, that they spring abundantly by layers also. CHAP. IV.

5. There is, besides these sorts we have named, one of a more scabrous harsh leaf, but very large, which becomes an huge tree, (frequent in the northern counties) and is distinguished by the name of the Witch-Hasle in our Statute Books, as serving formerly to make long bows of: The timber is not so good as the first more vulgar; but the bark, at a proper season of the year, will serve to make coarse bast-rope.

6. Of all the trees which grow in our woods, there is none which does better suffer the transplantation than the Elm; for you may remove a tree of twenty years growth with undoubted succeſs: It is an experiment I have made in a tree almost as big as my waist; but then you must totally disbranch him, leaving all the summit entire; and, being careful to take him up with as much earth as you can, refresh him with abundance of water. This is an excellent and expeditious way for great persons to plant the acceſses of their houses with: for, being disposed at sixteen or eighteen feet interval, they will, in a few years, bear goodly heads, and thrive to admiration. Some that are very cautious, emplaster the wounds of such over-grown Elms with a mixture of clay and horse-dung, bound about them with a wisp of hay or fine moſs; and I do not reprove it, provided they take care to temper it well, so as the vermine nestle not in it. But for more ordinary plantations, younger trees, which have their bark smooth and tender, clear of wens and tuberous bunches, (for those of that sort seldom come to be stately trees,) about the scantling of your leg, and their heads trimmed at five or six feet height, are to be preferred before all other. Cato would have none of these sorts of trees to be removed till they are five or six fingers in thickneſs; others think they cannot take them too young; but experience, the best mistreſs, tells us, that you can hardly plant an Elm

BOOK I.

too big[n] There are who pare away the root within two fingers of the stem, and quite cut off the head; but I cannot commend this extreme severity, no more than I do the strewing of oats in the pit; which, fermenting with the moisture and frequent waterings, is believed much to accelerate the putting forth of the roots; not considering that, for want of air, they corrupt and grow musty, which more frequently suffocates the roots, and endangers the whole tree.

7. I have affirmed how patient this tree is of transplantation; not only for that I observe so few of them to grow wild in England, and where it may not be suspected but they, or their predeceſsors, have been planted by some industrious hand; but for that those incomparable walks and vistas of them, both at Aranjuez, Casal del Campo, Madrid, the Escurial, and other places of delight belonging to the King and Grandees of Spain, are planted with such as they report Philip the second caused to be brought out of England; before which (as that most honourable person, the Earl of Sandwich, when his Majesty's Ambaſsador extraordinary at that court, writ to me) it does not appear there were any of those trees in all Spain. But, of that plantation, see it more particularly described in chapter vii. book iii. of this discourse, whither I refer my reader; whilst, as to my own inclination, I know of no tree amongst all the foresters, becoming the almost interminate Lontananza of walks and vistas, comparable to this majestic plant.

8. The Elm delights in a sound, sweet, and fertile land, something more inclined to loamy moisture, and where good pasture is produced; though it will also prosper in the gravelly, provided there be a competent depth of mould, and be refreshed with springs; in defect of which, being

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[n] It seems to have been thought an excellence amongst the Roman husbandmen to be able to transplant large trees. Virgil represents the old Corycian as poſseſsed of that knowledge in a high degree:

> Ille etiam seras in versum distulit *Ulmos*,
> Eduramque pirum, et spinos jam pruna ferentes,
> Jamque ministrantem platanum potantibus umbras. GEORG. iv.

In these verſes, it is remarkable that the poet has bestowed upon the trees ſuch epithets as prove them to have been of considerable stature.

planted on the very surface of the ground, the swarth pared first away, and the earth stirred a foot deep or more, they will undoubtedly succeed; but, in this trial, let the roots be handsomely spread, and covered a foot or more in height, and, above all, firmly staked. This is practicable also for other trees, where the soil is over moist or unkind; for, as the Elm does not thrive in too dry, sandy, or hot grounds, no more will it abide the cold and spungy; but loves places that are competently fertile, or a little elevated from these annoyances, as we see in the mounds and casting up of ditches, upon whose banks the female sort does more naturally delight. It seems to be so much more addicted to some places than to others, that I have frequently doubted whether it be a pure indigene° or translatitious; and not only because I have hardly ever known any considerable woods of them, (besides some few nurseries near Cambridge, planted, I suppose, for store) but most continually in tufts, hedge-rows, and mounds; and that Shropshire, and several other Counties, have rarely any growing in many miles together. In the mean time, some affirm they were first brought out of Lombardy, where indeed I have observed very goodly trees about the rich grounds, with Pines among them; for I hear of none either in Saxony or Denmark, nor in France, growing wild, who all came and preyed upon us after the Romans. But I leave this to the learned.

9. The Elm is, by reason of its aspiring and tapering growth, unleſs it be topped to enlarge the branches and make them spread low, the least offensive to corn and pasture-grounds; to both which, and the cattle, it affords a benign shade, defence, and agreeable ornament; but then, as to pastures, the wandering roots, (apt to infect the fields and graſs with innumerable suckers,) and the leading mother-root, ought to be quite separated on that part, and the suckers eradicated: The like should be done where they are placed near walks of turf or gravel.

10. It should be planted as shallow as may be; for, as we noted, deep interring of roots is amongst the catholic mistakes, and this the greatest to which trees are obnoxious. Let new-planted Elms be kept

°The Elm is certainly a native of this country, of which there can be no stronger proof, than that there are near forty places in this kingdom which have their names from it, most of which are mentioned in Doomsday-book.

BOOK I. moist by frequent refreshings upon some half-rotten fern, or litter, laid about the foot of the stem, the earth being a little stirred and depreſsed for the better reception and retention of the water.

11. Lastly, your plantations must, above all things, be carefully preserved from cattle, and the concuſsions of impetuous winds, till they are out of reach of the one, and sturdy enough to encounter the other.

12. When you lop the side-boughs of an Elm, (which may be about January, for the fire, and more frequently, if you desire to have them tall, or that you would form them into hedges, for so they may be kept plashed, and thickened to the highest twig, affording both a magnificent and august defence against the winds and sun,) I say, when you trim them, be careful to indulge the tops, for they protect the body of your trees from the wet, which always invades those parts first, and will, in time, perish them to the very heart; so as Elms, beginning thus to decay, are not long prosperous. Sir Hugh Platt relates, as from an expert Carpenter, that the boughs and branches of an Elm should be left a foot long, next the trunk, when they are lopped: but this is to my certain observation, a very great mistake, either in the relator or author; for I have noted of many Elms, so disbranched, that the remaining stubbs grew immediately hollow, and were as so many conduits or pipes, to hold and convey the rain to the very body and heart of the tree.

13. There was a cloyster of the right French Elm in the little garden near to her Majesty's, the Queen-mother's, chapel at Somerset-house, which were, I suppose, planted there by the industry of the S. F. Capuchines, that would have directed you to the incomparable use of this noble tree, for shade and delight, into whatever figure you will accustom them. I have myself procured some of them from Paris, but they were so abused in the transportation, that they all perished, save one which now flourishes with me: I have also lately graffed Elms, to a great improvement of their heads. Virgil tells us they will join in marriage with the Oak[p], and they would both be tried; and the succeſs

[p] Virgil is very animated in his idea of engrafting an Oak upon an Elm. He represents the acorns as the fruit of the marriage; and the swine cracking them under the tree: "Glandemque sues fregere sub Ulmis."

for such ligneous kinds will be the more probable, if you graff under the earth, upon or near the very root itself, which is likely to entertain the cion better than when more exposed, till it be well fixt, and have made some considerable progrefs.

14. When you would fell, let the sap be perfectly in repose, as it is commonly about November or December, even to February, after the frost hath well nipped them: I have already alleged my reason for it; and I am told, that both Oak and Elm so cut, the very saplings (whereof rafters, spars, &c. are made) will continue as long as the very heart of the tree without decay. In this work, cut your kerfe near to the ground, but have a care that the tree suffers not in the fall, and be ruined with its own weight: This depends upon your woodman's judgment in disbranching, and is a necefsary caution to the felling of all other timber-trees. If any begin to doat, pick out such for the ax, and rather trust to its succefsor; and, should you cut over late, by floating them two or three months in the water, it prevents the worm, and proves the best of seasons.

15. Elm, is a timber of most singular use, especially where it may lie continually dry or wet, in extremes; therefore proper for water-works, mills, the ladles and soles of the wheel, pipes, pumps, aqueducts, pales, ship-planks beneath the water-line; and some that have been found buried in bogs, have turned like the most polished and hardest ebony, only discerned by the grain; also for wheelwrights, handles for the single handsaw, &c. Rails and gates made of Elm, thin sawed, are not so apt to rive as Oak; the knotty for naves, hubs; the straight and smooth for axle-trees; and the very roots for curiously dappled works; it scarce has any superior for kerbs of coppers, featheridge, and weather-boards, (but it does not, without difficulty, admit the nail without boring,) chopping blocks, blocks for the hat-maker, trunks and boxes to be covered with leather, coffins, dreſsers and shovel-board tables of great length, and a lustrous colour if rightly seasoned; also for the carver, by reason of the tenor of the grain, and toughneſs, which fits it for all those curious works of fruitages, foliage, shields, statues, and most of the ornaments appertaining to the orders of architecture, and for not being much subject to warping I find that, of old, they used it even for hinges and hooks of doors; but then, that part of the plank which grew

BOOK I. towards the top of the tree, was, in work, to be always reversed; and for that it is not so subject to rift, Vitruvius commends it both for tenons and mortises: But, besides these, and sundry other employments, it makes also a second sort of charcoal; and, finally, which I must not omit, the use of the very leaves of this tree, especially of the female, is not to be despised; for, being suffered to dry in the sun upon the branches, and the spray stripped off about the decrease in August, as also where the suckers are supernumerary and hinder the thriving of their nurses, they will prove a great relief to cattle, in winter and in scorching summers, when hay and fodder is dear; they will eat them before oats, and thrive exceedingly well with them; remember only to lay your boughs up in some dry and sweet corner of your barn.—It was for this the poet praised them, and the epithet was advised:

Fœcundæ frondibus Ulmi. VIRG.

Fruitful in leaves the Elm.

In some parts of Herefordshire they gather them in sacks for their swine and other cattle, according to this husbandry [q]. But I hear an ill report of this tree for bees, that, surfeiting of the blooming seeds, they are obnoxious to the lask [r] at their first going abroad in the spring, which

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[q] The Roman husbandmen fed their cattle with the leaves of trees, but the preference was given to those of the Elm. The English husbandman, who lives in the neighbourhood of extensive woods, would do well to attend to this branch of rural œconomy. When hay is dear, dried leaves (of all kinds) are highly valuable. Columella considers twenty pecks of dried leaves as equal to thirty pounds of hay. "Si grano abstinemus, frondis aridæ "corbis pabulatoria modiorum viginti sufficit, vel fœni pondo triginti." Lib. vi. c. 3.

[r] Virgil gives a most beautiful description of this malady, so fatal to his favourite bees:

But when, as human ills descend to bees,
The pining nation labours with disease;
Chang'd is their glittering hue to ghastly pale,
Roughneſs and leanneſs o'er their limbs prevail:
Forth the dead citizens with grief are borne,
In solemn state the sad attendants mourn.
Clung by the feet they hang the live-long day
Around the door, or in their chambers stay;
Hunger and cold, and grief, their toils delay.
'Tis then in hoarser tones their hums resound,
Like hollow winds the rustling forest round,

endangers whole stocks, if remedies be not timely adhibited; therefore, it is said, in great Elm countries they do not thrive; but the truth of which I am yet to learn. The green leaf of the Elm, contused, heals a green wound or cut, and, boiled with the bark, consolidates fractured bones. All the parts of this tree are abstersive, and therefore sovereign for the consolidating of wounds; they asuage the pains of the gout; and the bark, decocted in common water, to almost the consistence of a syrup, adding a third part of aqua vitæ, is a most admirable remedy for the ischiadica, or hip-pain, the place being well rubbed and chafed by the fire. For other wonderful cures performed by the liquor, &c. of this tree, see Mr. Ray's History of Plants, vol. ii. lib. xxv. cap. i. sect. 5. And for other species of the Elm, consult his Supplement. CHAP. IV.

Or billows breaking on a distant shore;
Or flames in furnaces that inly roar.
Galbanean odours here I shall advise;
And thro' a reed to pour the sweet supplies
Of golden honey to invite the taste
Of the sick nation, to their known repast:
Bruis'd galls, dry'd roses, thyme, and centaury join,
And raisins ripen'd on the Psithian vine.
Besides, in meads the plant Amellus grows,
And from one root thick stalks profusely throws,
Which easily the wand'ring simpler knows:
Its top a flower of golden hue displays,
Its leaves are edg'd with violet-tinctur'd rays:
Rough is the taste; round many an holy shrine
The sacred priests its beauteous foliage twine:
This, where meand'ring Mella laves the plains,
Or, in the new-shorn valley, seek the swains:
Its roots infuse in wine, and at their door
In baskets hang the medicated store.

WARTON.

CHAP. V.

The BEECH[s].

1. FAGUS, the BEECH. I rank this before the martial Ash, because it commonly grows to a greater stature. It is of two or three kinds, and is numbered among the glandiferous trees. But here I may not omit a

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[s] The BEECH is a beautiful as well as a valuable tree. The leaves are of a pleasant green, and many of them remain on the branches during the winter, when they present themselves of a brown colour; for which reason this tree is proper to shelter habitations, and such places as require to be screened from violent winds. It may be planted either in woods or open fields, in both which stations it grows to a considerable height, and carries with it a proportionable trunk. In hedge-rows and the borders of fields it spreads its branches to an amazing extent.——Of this genus there are three species.

1. FAGUS *(SYLVATICA)* foliis ovatis obsolete serratis. Sp. Plant. 1416. Fagus. Bauh. Pin. 419. *THE BEECH TREE.*

This is the common Beech, of which the buds begin to open about the 15th of April, and the leaves come out about the 21st. The flowers show themselves about the 12th of May, and by the 4th of June they are in full bloom. These are succeeded by the mast, an angular fruit, which is ripe in the autumn.

2. FAGUS *(CASTANEA)* foliis lanceolatis acuminato-serratis subtus nudis. Lin. Sp. Pl. 1416. Castanea Sativa. Bauh. Pin. 418. *THE CHESNUT.*

This is the Spanish Chesnut which is particularly described in book i. ch. viii.

3. FAGUS *(PUMILA)* foliis lanceolato-ovatis acute serratis subtus tomentosis, amentis filiformibus nodosis. Gron. Virg. 150. Castanea Pumila Virginiana, racemoso fructu parvo in singulis capsulis echinatis unico. Pluk. Alm. 90. Cateb. Car. i. p. 9. *THE CHINQUAPIN.*

This species is called the Dwarf Chesnut, and grows to the height of ten feet. The stem is of a brown colour, and divides into several branches near the top. The leaves, as described, are of an oval spear-shaped figure, acutely serrated, with an hoary cast on their underside. The flowers come out in the spring in slender knotted catkins. They are of a greenish colour, and are rarely succeeded by ripe seeds in this country. This kind is very hardy, and thrives in a moist soil and shady situation.

The BEECH, in the Linnæan system, is ranked in the class and order *Monoecia Polyandria*, which comprehends such plants as have male and female flowers upon the same plant, the male flowers having numerous stamina.

The Beech Tree.

Published June 1st 1796 by J. Hunter, M.D. as the Act directs.

J. Miller del. & sc.

note of the accurate critic Palmerius, upon a paſsage in Theophrastus, where he animadverts upon his interpreter, and shows that the antient Φηγὸς was by no means the Beech, but a kind of Oak; for that the figure of the fruit is so widely unlike it, that being round, this triangular: And CHAP. V.

This tree is propagated by sowing the mast in the seminary, and afterwards transplanting the seedlings into the nursery; for which consult the directions given in the notes upon page 42.

When these trees are designed for standards in fields, parks, &c. they must be permitted to grow in the nursery till they are of a proper size, when they should be carefully taken up, and planted in the same manner as formerly directed for the Elm.—When intended for woods, the ground must be prepared as for the Wych Elm; they should be planted at the same distance, of the same size, and thinned in the same manner.

The Beech naturally delights in a chalky or stony ground, and the bark, upon such land, is clear and smooth; a certain indication that the soil suits the tree. And although this timber is not so valuable as many other kinds, yet as it will thrive in soils and situations where few other trees will grow, the propagation of it should be encouraged. Besides this good quality, it is known to afford an agreeable shade; the leaves make a fine appearance in summer, and continue as late in autumn as any of the deciduous kinds.

When planted upon stony or chalky mountains, the Beech will resist the winds better than most other trees, but then the plants should be taken from a nursery of a similar soil; for if they are raised upon rich land and in a warm exposure, and afterwards carried to a bleak situation and barren soil, they will seldom thrive: And this rule is supposed by some planters to hold good in most other trees, contrary to the practice of all Nurserymen, who constantly raise their forest-trees upon good land. However, let this be remarked, that the best-rooted plants are always produced upon the best land—and in all kinds of planting, a good root is an eſsential consideration. Upon the whole, the best and least expensive method is to raise plantations of this tree by sowing the mast where the plants are to remain, agreeable to the general idea given in chap. iii. book i. When raised in this manner, they will not sustain the inconveniences arising from the change of soil and situation. In Berkshire, the Beech-woods are exceedingly well managed, by continually clearing away the beech-stems, from eight down to three or four inches girt, where they stand too thick, or appear unhealthy. The best trees are sold to coachmakers, wheelwrights, and farmers, at sevenpence per foot; the others are generally cut up into billets, and faggots, for the bakers in the country; and great quantities are sent down to London for the bakers there, as well as for packing in the holds of ships. The woodman marks the billets according to their size, with one, two, or three notches, which are considered as so many farthings worth, when the billets are sold; and, by this means, he is enabled to ascertain not only the value of the wood cut up, but pays his workmen accordingly, at the rate of of sixpence for every 255 notches, which is called a load. Those who take care of their woodlands, permit their labourers, during the winter months, to take up the old roots from which no shoot is rising, on condition that the workmen plant new sets, in a proper manner. By this judicious practice a constant succeſsion is kept up at no expence.

BOOK I. both Theophrastus and Pausanias make it indeed a species of Oak, as already we have noted in chap. iii. wholly differing in trunk, as well as fruit and leaf; to which he adds, (what determines the controversy) ξύλον τῆς φηγοῦ ἰσχυρότερον καὶ ἀσηπέστερον; "that it is of a firmer timber and not

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Virgil feelingly describes the cooling shade of the Beech, in well-known verses.

Tityre, tu patulæ recubans sub tegmine fagi
Sylvestrem tenui Musam meditaris avena. ECL. i.

Tantum inter densas, umbrosa cacumina, fagos
Assidue veniebat.———————— ECL. ii.

The antient shepherds frequently carved their love verses upon the green bark of this tree, which was no bad substitute for the Egyptian papyrus.

Immo hæc, in viridi nuper quæ cortice fagi
Carmina descripsi, et modulans alterna notavi,
Experiar.———————— ECL. v.

They also wrote upon the bark of the *living* tree, and as the letters must have been of a large size, and cut deep, we may reasonably suppose that they seldom went much farther than the name of their mistress, with a few tender epithets:

Certum est in Sylvis, inter Spelæa ferarum,
Malle pati, tenerisque meos incidere amores
Arboribus: crescent illæ, crescetis amores. ECL. x.

The same beautiful thought is preserved in the epistle of Œnone to Paris:

Incisæ servant a te mea nomina fagi:
Et legor Œnone falce notata tua.
Et quantum trunci, tantum mea nomina crescunt:
Crescite, et in titulos surgite recta meos. OVID.

This custom of carving favourite names upon the bark of trees, seems to have derived its origin from the simplicity of nature, and consequently must have been common to all ages. Shakspeare says, "A man haunts the forest that abuses our young trees with carving "*Rosalind* upon their bark."

Beechen bowls, curiously carved, were much prized by the antient shepherds. Menalcas, in his dispute with Damætas, speaks highly in praise of his two beechen bowls, considering them as superior in value to Damætas's young cow:

————————pocula ponam
Fagina, cælatum divini opus Alcimedontis. ECL. iii.

Pliny relates that beechen vessels were employed in religious ceremonies; but in general they were considered as the furniture of the meanest people:

Terra rubens crater, pocula fagus erant. OVID.

obnoxious to the worm;" neither of which can so confidently be said of the Beech: Yet La Cerda, too, seems guilty of the same mistake. But, leaving this, there are of our Fagi two or three kinds, viz. the Mountain, where it most affects to grow, which is the whitest, and most sought after by the turner; and the Campestrial, or wild, which is of a blacker colour, and more durable. They are both to be raised from the mast, and governed like the Oak, of which amply; and that is absolutely the best way of furnishing a wood; unless you will make a Nursery, and then you are to treat the mast as you are instructed in the chapter of Ashes, sowing them in autumn, or later, even after January, or rather nearer the spring, to preserve them from vermine, which are very great devourers of them. But they are likewise to be planted of young seedlings, to be drawn out of the places where the fruitful trees abound. In transplanting them, cut off only the boughs and bruised parts two inches from the stem to within a yard of the top, but be very sparing of the root; this for such as are of pretty stature. They make spreading trees, and noble shades with their well-furnished and glistering leaves, being set at forty feet distance; but they grow taller and more upright in the forests, where I have beheld them, at eight and ten feet, shoot into very long poles; but neither so apt for timber nor fuel. The shade unpropitious to corn and grass, but sweet, and, of all the rest, most refreshing to the weary shepherd—*lentus in umbra*—echoing Amaryllis with his oaten pipe. Mabillon tells us, in his Itinerary, of the old Beech at Villambrosa to be still flourishing, and greener than any of the rest, under whose umbrage the famous Eremit Gaulbertus had his cell.

This tree, planted in palisade, affords an useful and pleasant skreen to shelter orange and other tender case-trees from the parching sun, &c. growing very tall, and little inferior to the Horn-beam, or Dutch Elm. In the valleys, where they stand warm and in consort, they will grow to a stupenduous procerity, though the soil be stony and very barren; also upon the declivities, sides, and tops of high hills, and chalky mountains especially: for, though they thrust not down such deep and numerous roots as the Oak, and grow to vast trees, they will strangely insinuate their roots into the bowels of those seemingly impenetrable places, not much unlike the Fir itself, which, with this so common tree, the great Cæsar denies to be found in Britain, "*materia cujusque generis, ut in Gallia, præter Fagum et Abietem;*" but certainly from a grand

BOOK I. mistake, or rather, for that he had not travelled much up into the country[t]. Virgil reports it will graff with the chesnut.

2. The Beech serves for various uses of the housewife.

Hinc olim juvenis mundi melioribus annis,
Fortunatarum domuum non magna fupellex
Tota petebatur; sellas, armaria, lectos,
Et mensas dabat, et lances, et pocula Fagus. COULEIUS.

Hence, in the world's best years, the humble shed
Was happily and fully furnished:
Beech made their chests, their beds, and the join'd-stools:
Beech made the board, the platters, and the bowls.

With it the turner makes dishes, trays, rims for buckets, trenchers, dreſser boards, and other utensils. It serves the wheeler and joiner, for large screws, &c. The upholsterer uses it for sellies, chairs, bed-steads, &c. It makes shovels and spade-graffs for the husbandman, and is useful to the bellows-maker. Floats for fishers' nets, instead of corks, are made of its bark. It is good for fuel, billet, bavin, and coals, though one of the least lasting; and its very shavings are good for fining of wine. Peter Crescentius writes, that the ashes of Beech, with proper mixture, is excellent to make glaſs with. If the timber lie altogether under water, it is little inferior to Elm, as I find it practised and aſserted by shipwrights. Of old they made their Vasa Vindemiatoria and Corbes Meſsoriæ, as we our pots for strawberries, with the rind of this tree; nay, and veſsels to preserve wine in; and that curiously wrought cup, which the shepherd, in the Bucolicks, wagers withal, was engraven by Alcimedon upon the bark of the Beech. And an happy age it seems:

[t] From the authority of antient times, and from the evidence of our own eyes, we must suppose the Fir to be a native of this country. The quantity of this kind of wood, discovered in many bogs of this island, leaves the matter beyond a doubt: But, with regard to what Cæsar says of the Beech, the argument against him is not so conclusive. The ingenious Mr. Hasted, in the 19th number of the 61ſt vol. of Phil. Trans. speaking of Cæsar's observation, says, "both of which (the *Fir* and *Beech)* were in the greatest plenty "here at that very time; the latter was particularly so in the county of Kent, the only "place he might be said to be acquainted with." But for this Mr. Hasted quotes no authorities.

——————Nec bella fuerunt,
Faginus adstabat cum scyphus ante dapes. TIBUL.

——————No wars did men molest,
When only beechen bowls were in request.

Of the thin lamina, or scale of this wood, as our cutlers call it, are made scabbards for swords, and band-boxes, superinduced with thin leather or paper; boxes for writings, hat-cases, and formerly book-covers. I wonder we cannot split it ourselves, but send it into other countries for such trifles. In the cavities of these trees bees much delight to hive themselves. Yet for all this, you would not wonder to hear me deplore the so frequent use of this wood, if you did consider that the industry of France furnishes that country for all domestic utensils with excellent Walnut, a material infinitely preferable to the best Beech, which is indeed good only for shade, and for the fire, as being brittle, and exceedingly obnoxious to the worm, where it lies either dry, or wet and dry, as has been noted; but, being put ten days in water, it will exceedingly resist the worm. To which, as I said, it is so obnoxious, that I wish the use of it were, by a law, prohibited all joiners, cabinet-makers, and such as furnish tables, chairs, bedsteads, coffers, screws, &c. They have a way to black and polish it so as to render it like Ebony; and, with a mixture of soot and urine, imitate the Walnut; but as the colour does not last, so neither does the wood itself, for I can hardly call it timber, soon after the worm has seized it, unless one spunge and imbibe it well with the oil of spike, where they have made holes. Ricciolus, indeed, much commends it for oars: and some say, that the vast Argo was built of the Fagus, a good part of it at least, as we learn out of Apollonius: This will admit of interpretation. The Fagus yet, by Claudian, is mentioned with the Alder:

Sic qui vecturam longinqua per æquora merces
Molitur tellure ratem, vitámque procellis
Objectare parat; Fagos metitur et Alnos,
Et variam rúdibus silvis accommodat usum.

So he that to export o'er sea his wares,
A vessel builds, and to expose, prepares
His life to storms, first Beech and Alder cuts;
And measuring them to various uses puts.

BOOK I. But, whilst we thus condemn the timber, we must not omit to praise the mast, which fatten our swine and deer; and hath, in some families, even ſupported men with bread. Chios endured a memorable ſiege by the benefit of this mast. And, in some parts of France, they now grind the buck in mills; it affords a sweet oil, which the poor people eat most willingly. But there is yet another benefit which this tree presents us; its very leaves, which make a natural and most agreeable canopy all the summer, being gathered about the fall, and somewhat before they are much frost-bitten, afford the best and easiest matreſses in the world to lay under our quilts instead of straw; because, besides their tenderneſs and loose lying together, they continue sweet for seven or eight years long, before which time straw becomes musty and hard: They are thus used by divers persons of quality in Dauphiny; and, in Switzerland, I have sometimes lain on them to my great refreshment: So as, of this tree, it may properly be said,

——Silva domus, cubilia frondes. JUVENAL.

The wood's an house, the leaves a bed.

Being pruned, it heals the scar immediately, and is not apt to put forth so soon again as other trees.

The stagnate water in the hollow trees cures the most obstinate tetters, scabs and scurfs in man or beast, fomenting the part with it: The leaves chewed, are wholesome for the gums and teeth; and the very buds as they are in winter hardened and dried upon the twigs, make good tooth-pickers. Swine may be driven to mast about the end of August, but it is observed, that, when they feed on it before it be mature, it intoxicates them for a while; and that, generally, their fat is not so good or solid, but drips away too soon. In the mean time the kernels of the mast are greedily devoured by squirrels, mice, and, above all, by dormice, who, harbouring in the hollow trees, grow so fat, that, in some countries abroad, they take infinite numbers of them; I suppose, to eat: and what relief they give to thrushes, blackbirds, fieldfares, and other birds, every body knows.

The Hornbeam Tree.

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J. Miller del. & Sc.

CHAP. VI.

The HORN-BEAM[u].

CHAP. VI.

1. OSTRYS, the HORN-BEAM. This, by some, is called the Horse-beech, from the resemblance of the leaf; and in Latin is named Carpinus. It is planted of sets, though it may likewise be raised from the seeds, which, being mature in August, should be sown in October; these lie a year in the bed, which must be well and carefully shaded so soon as they peep. But the more expeditious way is by layers or sets of about an inch diameter, and cut within half a foot of the earth: Thus it will advance to a considerable tree. The places it chiefly desires to grow

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[u] Of this GENUS there are only two species.

1. CARPINUS *(BETULUS)* squamis strobilorum planis. Lin. Sp. Pl. 1416. *Horn-beam with flat scales to the cones.* Carpinus. Dod. Pemp. 841. *COMMON HORN-BEAM.*

This sort is very common in many parts of England, but is rarely suffered to grow as a timber-tree, being generally pollarded by the country people; yet, where the young trees have been properly treated, they have grown to a large size. Mr. Miller mentions his having seen some of them in woods, upon a cold stiff clay, that were near seventy feet in height, with large noble stems, perfectly straight and sound. Of late years, this has only been considered as a shrub, and seldom cultivated but for under-wood in the country, and for hedges in the nurseries, after the French taste; for in most of their great gardens, their *Cabinets*, &c. are formed of these trees, as are their trelifses and hedges which surround their plantations. But, since these ornaments have been banished from the English gardens, there has been little demand for this tree. As the Horn-beam will thrive upon cold, barren, and exposed hills, and in such situations where few other trees will grow, it may be cultivated to advantage by the proprietors of such lands. It will resist the violence of winds better than most other trees, and is by no means slow in its growth. But where it is propagated for timber, it should be raised from seeds, upon the same soil, and in the same situation where it is designed to grow; and not be brought from very rich land, and a warm exposure. The seeds should be sown in the autumn, soon after they are ripe; for, if they are kept out of the ground till the spring, the plants will not come up till the following year. When the plants appear, they must be kept clear from weeds, and treated as other forest-trees. In two years they will be fit to transplant; for the sooner all trees that are designed for timber are planted where they are to remain, the larger they will grow, and the wood will be firmer and more durable. When these are not intermixed with other trees, they should be planted close, especially on the outside of the plantations, that they may protect and draw each other up; and if they are kept clean from weeds for three or four years, it will greatly promote their growth; after which the plants will need no further afsistance in that particular. As the trees advance in

BOOK I. in, are cold hills, stiff ground, and the barren and most exposed parts of woods. We have it no where more abounding, in the south, than in the woods of Hertfordshire; very few westward.

2. Amongst other uses, it serves for mill-cogs, for which it excels either Yew or Crab; it makes good yoak-timber, whence of old, and that it was

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growth, they should be thinned, which must be done with caution, cutting away the most unpromising plants gradually, so as not to let in too much cold air at once upon those that are left, especially on the borders of the plantation. For, in all young plantations of timber, it is much better to take away a few trees every year, than, as is too often practised, to permit all to grow till they are fit to be cut as under-wood, when a few trees are left for timber. By this injudicious practice, so much cold air is suddenly let in upon the timber-trees, that their growth is retarded for some years. The leaves of the Horn-beam remain upon the branches till the young buds push them off in the spring, which renders them proper to plant round the borders of other plantations in exposed situations; where they will defend the other trees in winter, and thereby promote their growth.

2. CARPINUS *(OSTRYA)* squamis strobilorum inflatis. Lin. Sp. Pl. 1417. *Horn-beam with inflated scales to the cones.* Ostrya ulmo similis, fructu recemoso lupulo simili. Bauh. Pin. 427. *THE HOP HORN-BEAM.*

This kind sheds its leaves in winter, with the Elm, and other deciduous trees: Though but lately known in this country, it is very common in Germany, growing promiscuously with the common sort. The Hop Horn-beam is of quicker growth than the common kind, but the goodneſs of the timber is not yet known, there being but few of these trees growing in England upon their own roots, most of them having been grafted upon the common Horn-beam, the usual method of propagating them in our nurseries. But the trees so raised are of short duration; for the graft generally grows much faster than the stock, so that in a few years there is a great disproportion in their size; and where they happen to stand exposed to strong winds, the graft is frequently broken from the stock, after many years growth. The two following are only varieties:

1. CARPINUS *(ORIENTALIS)* foliis ovato-lanceolatis serratis strobilis brevibus. *Horn-beam with oval, spear-shaped, sawed leaves, and the shortest cones.* Carpinus orientalis folio minori, fructu brevi. T. Cor. 40. *EASTERN HORN-BEAM, WITH A SMALLER LEAF AND SHORTER FRUIT.*

This tree is of humble growth, rarely rising, in this country, above ten or twelve feet in height. As it shoots out many horizontal irregular branches, it cannot be trained up to a stem. The leaves are much smaller than those of the common Horn-beam, and the branches grow closer together, which qualifies it for low hedges, where such are wanted in gardens. Being a very tonsile plant, it may be kept in leſs compaſs than almost any deciduous tree. It is as hardy as any of the other sorts; but, at present, it is rare in our nurseries.

2. CARPINUS *(VIRGINIANA)* foliis lanceolatis acuminatis, strobilis longiſsimis. *Horn-beam with pointed, spear-shaped leaves, and the longest cones.* Carpinus Virginiana florescens. Pluk. *VIRGINIAN FLOWERING HORN-BEAM.*

as well flexible as tough, it was called ζυγία; heads of beetles, stocks and handles of tools are made of it. It is likewise for the turner's use excellent. It makes good fire-wood, where it burns like a candle; and was of old so employed:

Carpinus tædas fissa facesque dabit.

This sort grows to the height of thirty feet, and is of quick growth. It sheds its leaves in autumn, about the same time with the Elm. During the time of its verdure it makes a good appearance, being cloathed with leaves of a deep green colour, resembling the long-leaved Elm more than the Horn-beam.

The HORN-BEAM, in the Linnæan system, is ranked in the class and order *Monoecia Polyandria*, which comprehends such plants as have male and female flowers on the same plant, the male flowers having numerous stamina. The leaves begin to open about the latter end of March, and are quite out by the middle of April; and the flowers are in full bloom towards the end of that month.

The common Horn-beam is raised from seeds, as already observed, but the other kinds are propagated by layers, for which purpose a few plants should be procured for stools; those, for the Eastern Horn-beam, should be planted a yard asunder, and the others about two yards. After the plants have made some young shoots, they should be layered in the autumn, and by that time twelve months they will have struck root; at which time or early in the spring, they should be taken off and planted in the nursery, observing to brush up the stools, that they may afford young shoots to be layered the succeeding autumn.

In Westphalia, and other parts of North Germany, the Horn-beam is in great repute. There they make a hedge of it which answers Columella's description of a good fence:

——————Neu sit pecori, neu pervia furi. DE HORT.

When the German husbandman erects a fence of Horn-beam, he throws up a parapet of earth, with a ditch on each side, and plants his sets (raised from layers) in such a manner, as that every two plants may be brought to intersect each other in the form of a St. Andrew's cross. In that part where the two plants cross each other, he scrapes off the bark, and binds them closely together with straw. In consequence of this operation, the two plants consolidate in a sort of indissoluble knot, and push from thence horizontal, slanting shoots, which form a living palisado, or *chevaux de frize;* so that such a protection may be called a rural fortification. These hedges, being pruned annually, and with discretion, will, in a few years, render the fence impenetrable in every part. It is not uncommon in Germany to see the sides of high roads thus guarded for many miles together; and it were to be wished that this example was followed in some places of this kingdom. I am the more inclined to recommend such hedges, as the Horn-beam is not delicate in point of soil, but will even thrive on land seemingly barren. When properly pruned, it will put out strong lateral shoots, within three inches of the ground, by which means it makes an impenetrable fence against cattle. It is also of quick growth; a thing of great consequence in the improvement of waste land.

Being planted in small foſses or trenches, at half a foot interval, and in the single row, it makes the noblest and stateliest hedge for long walks in gardens or parks, of any tree whatsoever whose leaves are deciduous, and forsake their branches in winter, because it grows tall, and so sturdy as not to be wronged by the winds; besides, it will furnish to the very foot of the stem, and flourishes with a gloſsy and polished verdure, which is exceedingly delightful, of long continuance, and, of all other, the harder woods, the speediest grower, maintaining a slender upright stem, which does not come to be bare and sticky in many years. It has yet this (shall I call it) infirmity, that, keeping on its leaves till new ones thrust them off, it is clad in ruſset all the winter long. That admirable espalier hedge in the long middle walk of the Luxembourg Garden at Paris, than which there is nothing more graceful, is planted of this tree; and so is that cradle, or close walk, with that perplexed canopy which lately covered the seat in his Majesty's garden at Hampton-Court; and, as now I hear, they are planted in perfection at New-park, the delicious villa of the noble Earl of Rochester, belonging once to a near kinsman of mine, who parted with it to King Charles the First of bleſsed memory. These hedges are tonsile; but, where they are maintained to fifteen or twenty feet height, which is very frequent in the places before mentioned, they are to be cut, and kept in order with a scythe of four feet long, and very little falcated; this is fixed on a long sneed, or straight handle, and does wonderfully expedite the trimming of these and the like hedges. An oblong square, palisadoed with this plant, or the Flemish Ornus, as is that I am going to describe, and may be seen in that inexhaustible magazine at Brompton-park, (cultivated by those two industrious fellow-gardeners, Mr. London and Mr. Wise,) affords such an *umbraculum frondium*, the most natural, proper station, and convenience for the protection of our Orange-trees, Myrtles, and other rare Perennials and Exotics, from the scorching darts of the sun, and heat of summer; placing the cases, pots, &c. under this shelter, when, either at their first peeping out of the winter conclave, or during the increasing heat of the summer, they are so ranged and disposed, as to adorn a noble area of a most magnificent paradisian dining-room, to the top of Hortulan pomp and bliſs, superior to all the artificial furniture of the greatest prince's court. Here the Indian Narciſsus, Tuberoses, Japan Lilies, Jasmines, Jonquills, Periclimena, Roses, Carnations, with all the pride of the parterre, intermixt between the tree-cases, flowery vases, busts, and statues,

entertain the eye, and breathe their redolent odours and perfumes to the smell. The golden fruit, the apples of the Hesperides, together with the delicious Ananas, gratify the taste, whilst the cheerful ditties of canorous birds recording their innocent amours to the murmurs of the bubbling fountain, delight the ear. At the same time the charming accents of the fair and virtuous sex, preferable to all the admired composures of the most skilful musicians, join in concert with hymns and hallelujahs to the bountiful and glorious Creator, who has left none of the senses which he has not gratified at once with their most agreeable and proper objects.

But, to return to Brompton: It is not to be imagined what a surprising scene such a spacious saloon, tapestried with the natural verdure of the glittering foliage, presents the spectator, and recompenses the toil of the ingenious planter; when, after a little patience, he finds the slender plants (set but at five or six feet distance, nor much more in height, well pruned and dreſsed) ascend to an altitude sufficient to shade and defend his paradisian treasure, without excluding the milder gleams of the glorious and radiant planet, with his cherishing influence and kindly warmth, to all within the inclosure—refreshed with the cooling and early dew pregnant with the sweet exhalations, which the indulgent mother and teeming earth sends up to nourish and maintain her numerous and tender offspring.

But, after all, let us not dwell here too long, whilst the inferences to be derived from those tempting and temporary objects, prompt us to raise our contemplations a little on objects yet more worthy our noblest speculations, and all our pains and curiosity, representing that happy state above, namely, the celestial paradise: Let us, I say, suspend our admiration a while of these terrestrial gaieties, which are of so short continuance, and raise our thoughts from being too deeply immersed and rooted in them, aspiring after those supernal, more lasting, and glorious abodes, namely, a paradise, not like this of ours, with so much pains and curiosity, made with hands, but eternal in the heavens, where all the trees are trees of life, the flowers all Amaranths; all the plants perennial, ever verdant, ever pregnant; and where those who desire knowledge may fully satiate themselves; taste freely of the fruit of that tree which cost the firſt gardener, and posterity, so dear; and where the most voluptuous inclinations to the allurements of the senses may take and eat, and still

BOOK I. be innocent: no forbidden fruit; no serpent to deceive; none to be deceived.

Hail! O hail then, and welcome you bleſsed Elysiums, where a new state of things expects us; where all the pompous and charming delights that detain us here a while, shall be changed into real and substantial fruitions, eternal springs, and pleasure intellectual, becoming the dignity of our nature!

I beg no pardon for the application, but deplore my no better use of it; and that, whilst I am thus upon the wing, I must now descend so soon again.

Of all the foresters, the Horn-beam preserves itself best from the brutting of deer, and therefore to be kindly entertained in parks. But the reason why, with us, we rarely find it ample and spreading, is, that our husbandman suffers too large and grown a lop before he cuts them off, which leaves such ghastly wounds as often prove exitial to the tree, or cause it to grow deformed and hollow, and of little worth but for the fire; whereas, were they oftener taken off when the lops were younger, though they did not furnish so great wood, yet the continuance and flourishing of the tree would more than recompense it.

3. They very frequently plant a clump of these trees before the entries of the most of the great towns in Germany, to which they apply timber-frames for convenience of the people to sit and solace in. Scamozzi, the architect, says, "That in his time he found one whose branches extended seventy feet in breadth;" this was at Vuimfen, near the Necker, belonging to the Duke of Wirtemberg; but that which I find planted before the gates of Strasburgh is a Platanus and a Lime-tree growing hard by one another, in which is erected a Pergula of fifty feet wide, and eight feet from the ground, having ten arches of twelve feet height, all ſhaded with their foliage; besides this, there is an over-grown Oak, which has an arbour in it of sixty feet diameter.

The common Ashe Tree.

Published June 1, 1776, by A. Hunter M.D. as the Act directs.

J. Miller del & Sculp.

CHAP. VII.

The ASH[x].

1. FRAXINUS, the ASH. This tree with us is reputed male and female, the one affecting the higher grounds, the other the plains, of a whiter wood, and rising many times to a prodigious stature so as in forty years from the key, an Ash hath been sold for thirty pounds sterling. And I have been credibly informed, that one person hath

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[x] Of this GENUS there are only three species.

1. FRAXINUS *(EXCELSIOR)* foliolis serratis, floribus apetalis. Lin. Sp. Plant. 1509.—*Ash-tree whose smaller laaves are serrated, and flowers having no petals.* Fraxinus excelsior. C. B. P. 416. *THE COMMON ASH.*

This is the common Ash-tree which grows naturally in most parts of England, and is so well known as to need no description. The leaves of this sort have generally five pair of lobes, and are terminated by an odd one; they are of a very dark green, and their edges are slightly sawed. The flowers are produced in loose spikes from the side of the branches, and are succeeded by flat seeds, which ripen in autumn: There is a variety with variegated leaves, which is preserved in some gardens.

2. FRAXINUS *(ORNUS)* foliolis serratis, floribus corollatis. Lin. Sp. Plant. 1510.—*Ash-tree whose smaller leaves are sawed, and flowers having petals.* Fraxinus humilior sive altera Theophrasti, minore et tenuiore folio. C. B. P. 416. *Dwarf Ash of Theophrastus, with smaller and narrower leaves. THE FLOWERING ASH.*

This is a low tree, seldom rising above twenty feet in height. The leaves are smaller and narrower than those of the common Ash. They are of a pleasant green, and more deeply serrated. From this tree is collected the inspifsated juice called manna. The flowers have petals, which are wanting in the common Ash.

3. FRAXINUS *(AMERICANA)* foliolis integerrimus, petiolis teretibus. Lin. Sp. Pl. 1510. *Ash-tree with the small leaves entire, and taper foot-stalks.* Fraxinus ex Novâ Angliâ pinnis foliorum in mucronem productioribus. Rand. Cat. Hort. Chels. *New England Ash with long acute points to the wings of the leaves. THE AMERICAN ASH.*

This was raised from seeds, which were sent from New England in the year 1724, by Mr. Moore. The leaves of this tree have but three, or at most but four pair of lobes, (or small leaves) which are placed far distant from each other, and are terminated by an odd lobe, which runs out into a very long point; they are of a light green and entire, having no serratures on their edges. This tree shoots into strong irregular branches, but does not grow to a large size in the trunk. It is propagated by grafting, or budding, upon the common Ash. Of this species there are two or three varieties.

BOOK I. planted so much of this one sort of timber in his life-time, as hath been valued worth fifty thousand pounds to be bought. These are pretty encouragements for a small and pleasant industry. That there is a lower and more knotty sort, every husbandman can distinguish.

The keys, or tongues, being gathered from a young thriving tree when they begin to fall, (which is about the end of October, and the ensuing month) are to be laid to dry, and then sowed any time betwixt that and Christmas; but not altogether so deep as your former masts. Thus they do in Spain, from whence it were good to procure some of the keys from their best trees. A very narrow seminary will be sufficient to store a whole country; they will lie a full year in the ground before they appear, therefore you must carefully fence them all that time, and have patience; but if you would make a considerable wood of them at once, dig or plough a parcel of ground, as you would prepare it for corn, and

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This GENUS of plants, in the Linnæan system, is ranked in the class and order *Polygamia Dioecia*, the polygamy being upon two distinct plants.

The flowers of the Ash begin to open about the sixteenth of April, and about the twenty-second they are in full blow. The leaves, also, of some of these trees growing in favourable situations, will, by this time, be out; though others will not show their foliage till the middle of May.

The common Ash is easily propagated from the keys, for which consult the directions given in page 42. The foreign kinds may also be raised from seeds, when they can be procured from abroad: Budding, however, is the general method; so that those who have not a correspondence in the countries where they grow naturally, should procure a plant or two of a sort, and should raise young Ashes of the common sort for stocks.—These stocks should be planted out in the nursery, a foot asunder, and two feet distant in the rows. When they are one year old, and grown to be about the thickness of a bean-straw, they will be of a proper size for working. A little after Midsummer is the time for the operation; and care must be observed not to bind the eye too tight. They need not be unloosed before the latter end of September. In March, the head of the stock should be taken off a little above the eye; and, by the end of the summer following, if the land be good, they will have made strong shoots. It is in this manner only that the variegated kinds can be increased; for their keys, when sown, invariably produce the common green-leaved Ash in return.

The timber of the Ash (the Oak only excepted) serves for the greatest variety of uses of any tree in the forest. Though a handsome tree, it ought by no means to be planted for ornament in places designed to be kept neat, because the leaves fall off, with their long stalks, very early in the autumn, and by their litter destroy the beauty of such places. Although this tree should not be planted near gravel walks and pleasure grounds, it is well

with the corn, especially oats, (or what other grain you think fittest) sow also good store of keys, some Crab-kernels &c. amongst them. Take off your crop of corn or seed in its season, and the next year following it will be covered with young Ashes, which will be fit either to stand, which I prefer, or be transplanted for divers years after; and these you will find to be far better than any you can gather out of the woods (especially suckers which are worth nothing) being removed at one foot stature, the sooner the better; for Ashes of two years thus taken out of the nursery, shall outstrip those of ten taken out of the hedge, provided you defend them well from cattle, which are exceedingly liquorish after their tops: The reason of this hasty transplanting, is to prevent their obstinate and and deep rooting—*tantus amor terræ*——which makes them hard to be taken up when they grow older, and that being removed, they take no great hold till the second year, after which they come away amain; yet I have planted them of five and six inches diameter, which have

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calculated for woods, and clumps in large parks, and for standards; but it should never be planted on the borders of tillage lands, because the dripping of the leaves is extremely prejudicial to corn, and the roots have a powerful tendency to draw the nourishment from the ground. Neither should it be planted near pasture ground, for if the cows eat the leaves or shoots, the butter will obtain a disagreeable taste. An Ash-tree, therefore, should never be permitted to grow in the hedge-rows of dairy farms.

A wood of these trees, rightly managed, will produce considerable advantages to the owner; for by the underwood, which will be fit to cut every fourteen or fifteen years for hop-poles, &c. there will be a regular income superior to the rent of the neighbouring lands, and still there will be a stock left for timber, which like an eſtate in reversion, will, at some future period, pour in considerable riches.

As the quickneſs of growth will depend upon the goodneſs of the soil, the number of years from the first planting to the first fall, will vary accordingly; if the wood be large, I would advise to have the first fall of poles very soon, that there may be an annual sale till the wood has been wholly cut down; and this should be so contrived, that the year after the last quarter is cut, that which was first begun on may be ready for a second fall. This will happen at an interval of about fifteen or twenty years, by which time the poles will be large; but if they are wanted for smaller purposes, the fall may be proportionably sooner.

Ash-pollards are of great service when fuel is scarce; a few of these trees will produce many loads of lop. The loppings make the sweetest of all fires, and will burn well either green or dry; but the intervals between the cuttings must not be too great; for if the branches be suffered to grow to a very great thickneſs, the taking them off will proportionably injure the tree.

BOOK I. thriven as well as the smaller wands. You may accelerate their springing by laying the keys in sand, and some moist fine earth, stratum super stratum; but lay them not too thick; keep them in a covered, though airy place for a winter, before you sow them; and the second year they will come away mainly, so you weed, trim, and cleanse them. Cut not his head at all, (which being young is pithy,) nor by any means the fibrous part of the roots, only that downright or tap-root (which gives our husbandmen so much trouble in drawing) is to be totally abated: but this work ought to be in the increase of October or November, and not in the spring. We are, as I told you, willing to spare his head rather than the side branches, (which, whilst young may be cut close) because, being yet young, it is of a spungy substance, but being once well fixed, you may cut him as close to the earth as you please; it will cause him to shoot prodigiously, so as in a few years to be fit for pike-staves; whereas if you take him wild out of the forest, you must of neceſsity strike off the head, which much impairs him. Hedge-row Ashes may the oftener be decapitated, and will show their heads again sooner than other trees so used. Young Ashes are sometimes in winter frost-burnt, black as coals, and then to use the knife is seasonable, though they do commmonly recover of themselves slowly. In South Spain, (where, as we said, are the best) after the first dreſsing, they let them grow till they are so big, as being cleft into four parts, each part is sufficient to make a pike-staff: I am told there is a Flemish Ash, planted by the Dutchmen in Lincolnshire, which in six years grows to be worth twenty shillings the tree; but I am not aſsured whether it be the Ash or Abele; either of them were, upon this account, a worthy encouragement, if at least the latter can be thought to bear that price, which I much question: From these low cuttings come our Ground-Ashes, so much sought after for arbours, eſpaliers, and other pole-works: they will spring in abundance, and may be reduced to one for a standard-tree, or for timber, if you design it; for thus, Hydra-like, a ground-cut Ash

Per damna, per cædes, ab ipso
Ducit opes animumque ferro. HOR.

By havock, wounds, and blows,
More lively and luxuriant grows.

Ash may be propagated from a bough slipt off with some of the old wood a little before the bud swells, but with difficulty by layers. Such as they

reserve for spears in Spain, they keep shriped up close to the stem, and plant them in close order, and moister places. These they cut above the knot (for the least nodosity spoils all) in the decrease of January, which were of the latest for us. It is reported that the Ash will not only receive its own kind, but graff, or be inoculated, with the Pear and Apple; but to what improvement I know not.

3. It is by no means convenient to plant Ash in plough-lands, for the roots will be obnoxious to the coulter; and the shade of the tree is malignant both to corn and grafs, when the head and branches overdrip and emaciate them; but in hedge-rows and plumps they will thrive exceedingly, where they may be disposed at nine or ten feet distance, and sometimes nearer: But in planting of a whole wood of several kinds of trees for timber, every third set at least should be an Ash. The best Ash delights in the best land, which it will soon impoverish, yet grows in any, so it be not over stiff, wet, and approaching to the marshy, unlefs it be first well drained; By the banks of sweet and crystal rivers and streams I have observed them to thrive infinitely. One may observe as manifest a difference in the timber of the Ash as of the Oak, much more than is found in any one kind of Elm *cæteris paribus;* for so the Ground-Ash, like the Oak, much excels a bough or branch of the same bulk, for strength and toughnefs; and in yet farther emulation of the Oak, it has been known to prove as good and lasting timber for building, nay, preferred before it, where there has been plenty of Oak; vast difference there is also in the strength of ground and quartered Ash.— It is likewise remarkable that the Ash, like the Cork-tree, grows when the bark is as it were quite peeled off, as has been observed in several forests, where the deer have bared them as far as they could climb. Some Ash is curiously cambleted and veined; I say, so differently from other timber, that our skilful cabinet-makers prize it equally with Ebony, and give it the name of Green Ebony, which their customers pay well for; and when our woodmen light upon it, they make what money they will of it: But to bring it to that curious lustre, so as it is hardly to be distiguished from the most curiously diapered Olive, they varnish their work with the China varnish, hereafter described, which infinitely excels the linseed oil that Cardan so commends when speaking of this root.— The truth is, the *Bruscum* or *Molluscum*, to be frequenty found in this wood, is nothing inferior to that of Maple, (of which hereafter,) being

BOOK I. altogether as exquisitely diapered, and waved like the lines of the Agate: Dr. Plott speaks of an eminent example of divers strange figures of fish, men, and beasts to be found in a dining-table made of an old Ash, standing in a gentleman's house somewhere in Oxfordshire; upon which is mentioned that of Jacobus Gafferellus, in his book of "Unheard-of Curiosities," namely of a tree found in Holland, which, being cleft, had, in several slivers, the figures of a chalice, a priest's alb, his stole, and several other pontifical vestments. Of this sort was the Elm growing at Middle-Aston in Oxfordshire, a block of which wood being cleft, there came out a piece so exactly resembling a shoulder of veal, that it was worthy to be reckoned among the curiosities of this nature.

4. The use of Ash is (next to that of Oak itself) one of the most universal: It serves the soldier—*et Fraxinus utilis hastis*[y]—and heretofore the scholar, who made use of the inner bark to write on, before the invention of paper. The carpenter, wheelwright, and cartwright find it excellent for ploughs, axle-trees, wheel-rings, harrows, bulls; it makes good oars, blocks for pullies, and sheffs, as seamen name them: For drying herrings no wood is like it, and the bark is good for the tanning of nets; and, like the Elm, (for the same property of not being apt to split and scale,) is excellent for tenons and mortises; also for the cooper, turner, and thatcher; nothing is like it for our garden palisade hedges, hop-yards, poles, and spars, handles and stocks for tools, spade-trees, &c. In sum, the husbandman cannot be without the Ash for his carts, ladders, and other tackling, from the pike, spear, and bow, to the plough; for of Ash were they formerly made, and therefore reckoned amongst those woods which, after long tension, have a natural spring, and recover their position; so as in peace and war it is a wood in highest request: In short, so useful and profitable is this tree, next to the Oak, that every prudent Lord of a Manor should employ one acre of ground with Ash to every twenty acres of other land, since in as many years it would be

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y Spears were antiently made of Myrtle, Cornel, and Hazle, but Pliny prefers the Ash for that purpose. "Obedientiſsima quocumque in opere fraxinus, eademque hastis corylo "melior, corno levior, sorbo lentior." Homer arms his heroes with spears of Ash:

> From Pelion's cloudy top an Ash entire,
> Old Chiron fell'd and shap'd it for his sire. POPE.

more worth than the land itself. There is extracted an oil from the Ash, by the proceſs on other woods, which is excellent to recover the hearing, some drops of it being distilled warm into the ears; and for the caries or rot of the bones, tooth-ach, pains in the kidneys and spleen, the anointing therewith is most sovereign[z]. Some have used the saw-dust of this wood, instead of guaiacum, with succeſs. The chymists exceedingly commend the seed of Ash to be an admirable remedy for the stone: But (whether by the power of magic or nature, I determine not) I have heard it affirmed with great confidence, and upon experience, that the rupture to which many children are obnoxious, is healed, by paſsing the infant through a wide cleft made in the bole or stem of a growing Ash-tree; it is then carried a second time round the Ash, and caused to repaſs the same aperture as before. The rupture of the child being bound up, it is supposed to heal as the cleft of the tree closes and coalesces. The manna of Calabria is found to exsude out of the leaves and boughs of this tree during the hot summer months[a]: Lastly,

[z] As Mr. Evelyn does not profeſs any knowledge in medicine, but on the contrary often makes an apology for his ignorance in that science, I shall only remark, that the boasted properties of the oil obtained from the Ash are not to be depended on, being only in common with oil obtained from any other tree. The curing a ruptured child, by paſsing its body through a cleft made in the bole of a young Ash-tree, has no foundation in reason or philosophy.

[a] The Ash described by Mr. Miller, under the title of *Fraxinus Rotundifolia*, is said by him to be the tree from whence manna is procured; but we are now informed by Dr. Dominico Cirilli, that it is the Fraxinus Ornus. The Doctor, in a letter addreſsed to Dr. Watson, and inserted in the sixtieth vol. of the Philosoph. Trans. says, "The Manna-tree, commonly "called Ornus by botanists, is a kind of Ash, and is to be found under the name "of Fraxinus Ornus in Linnæus's Sp. Plant. In all the woods near Naples the Manna-"tree is to be found very often, but, for want of cultivation, it never produces any manna, "and is rather a shrub than a tree. The manna is generally of two kinds, not on account "of the intrinsic quality of them being different, but because they are got in a different "manner. In order to have the manna, those who have the management of the woods "of the Orni, in the months of July and August, when the weather is very dry and warm, "make an oblong incision, and take off from the bark of the tree about three inches in "length and two in breadth; they leave the wound open, and by degrees the manna runs "out, and is almost suddenly thickened to its proper consistence, and is found adhering "to the bark of the tree. This manna is collected in baskets, and goes under the name "of *Manna Graſia*. When the people want to have a very fine manna, they apply to the "incision of the bark, thin straw, or small bits of shrubs, so that the manna, in coming "out, runs upon these bodies, and is collected in a sort of regular tubes, which give it the "name of *Manna in Cannoli*; that is, manna in tubes. This kind is always preferred to the "other, because it is free and clear."

BOOK I. the white and rotten dotard part composes the ground for our gallants sweet powder; and the truncheons make the third sort of the most durable coal, and is, of all other, the sweetest of our forest fuelling, and the fittest for ladies' chambers: it will burn even whilst it is green, and may be reckoned amongst the ἄκαπνα ξύλα. To conclude: The very dead leaves afford, like those of the Elm, relief to our cattle in winter; and there is a dwarf sort in France, (if in truth it be not, as I suspect, our Witchen-tree,) whose berries feed the poor people in scarce years; but it bears no keys like to ours, which, being pickled tender, afford a delicate salading: But the shade of the Ash is not to be endured, because the leaves produce a noxious insect; and for displaying themselves so very late, and falling very early, not to be planted for umbrage or ornament, especially near the garden, since (besides their predatious roots) the leaves dropping with so long a stalk, are drawn by clusters into the worm-holes, which foul the alleys with their keys, and suddenly infect the ground. Note, that the season for felling of this tree must be when the sap is fully at rest; for if you cut it down too early, or over late in the year, it will be so obnoxious to the worm, as greatly to prejudice the timber; therefore, be sure not to fell but in the three middle winter months, beginning about November. But in lopping of pollards, as of soft woods, Mr. Cooke advises it should be towards the spring, and that you do not suffer the lops to grow too great; also, that so soon as a pollard comes to be considerably hollow at the head, you suddenly cut it down, the body decaying more than the head is worth: The same he pronounces of taller ashes, and where the wood-peckers make holes (which constantly indicates their being faulty) to fell it in winter. I am astonished at the universal confidence of some, that a serpent will rather creep into the fire than over a twig of Ash; this is an old imposture of Pliny, who either took it upon trust, or we mistake the tree. For other species, see Raii Dendrolog. tom iii. lib. xxx. p. 95. De Fraxino, tom ii. p. 1704.

The Chesnut Tree

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J. Miller del. & Sc.

CHAP. VIII.

The CHESNUT[b].

1. CASTANEA, the CHESNUT. Of this Pliny reckons many kinds, especially about Tarentum and Naples; but we commend those of Portugal or Bayonne, choosing the largest, brownest, and most ponderous for fruit, such as Pliny calls Coctivæ, but the leſser ones for CH. VIII.

[b] Dr. Linnæus has, with great botanical propriety, made the CHESNUT a species of FAGUS; but as Mr. Evelyn and others have considered them as separate, I think I shall be more generally understood by retaining the old distinction.——The species are:

1. CASTANEA *(SATIVA)* foliis lanceolatis acuminato-serratis, subtus nudis. Lin. Sp. Pl. 1416. *Chesnut with spear-shaped leaves, which are sharply sawed, and naked on their under side.* Castanea sativa. C. B. P. 418. *THE CHESNUT-TREE.*

This beautiful tree deserves to be ranked with timber-trees of the first claſs, whether we consider its ornamental appearance when growing, or its uses when felled. The leaves are large, of a pleasant green colour, and in the autumn turn to a golden yellow; so that in that declining season, amongst the different tinges in a wood, this is very conspicuous, and makes an agreeable contrast. If these trees are planted in large wilderneſs quarters next the walks, or in woods by the side of the ridings, and are left untrimmed, as they ought to be, they will be feathered to the bottom, and not only make a beautiful appearance, but all the summer will hide those naked and crooked stems of other trees, in the plantations and woods, which are always esteemed disagreeable objects. This tree was formerly cultivated in this island in greater quantities than at present; and appears to have been the chief timber, in earlier times, used for building. It were greatly to be wished, that the antient spirit of propagating the Chesnut could be revived, as the timber is excellent in its kind, being as valuable as the Oak, and in many respects superior to it; like that king of our woods, (for this title the Oak must still retain,) it yields the industrious planter an annual crop. The nuts of this tree are well liked by deer, and swine prefer them to the acorn. The uses of the timber of this tree, like that of the Oak, are almost universal. It is not only excellent for all sorts of buildings, but is also serviceable for mill-timber and water-works; so that if pipes bored of this wood lie constantly under ground, they will endure longer than the Elm. Of the Chesnut are made tables, stools, chairs, chests, and bedsteads. It is preferred for the making all sorts of tubs and veſsels to hold liquor; and, in this respect, it is superior to Oak; because, when once thoroughly seasoned, it is not subject either to shrink or swell, but will constantly maintain an equal magnitude of bulk; and for this reason the Italians make their casks and tuns for wine of this wood. For smaller purposes it has its superior advantages: Poles of this tree, for hops, vines, &c. will last

BOOK I. raising timber. They are produced best by sowing and setting; previous to which, let the nuts be first spread to sweat, then cover them in sand: a month being past, plunge them in water and reject the swimmers: being dried for thirty days more, sand them again, and to the water-ordeal as before. Being thus treated till the beginning of spring, or in November, set them as you would do beans; and, as some practise,

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longer than of any other; and stakes of the underwood will last nearly twice as long as those of any other sort. Of the Chesnut there are several varieties which have accidentally arisen from seed, of which some have been supposed distinct species, but the difference lies only in the size of the fruit and leaves, which have been altered and improved by culture: so that the wild and manured Chesnut are undoubtedly the same. In many countries, where Chesnut-trees are cultivated, the people graft the largest and fairest fruit upon stocks raised from the nut. And these grafted trees are by the French called Maronnier; but they are unfit for timber.

2. CASTANEA *(PUMILA)* foliis lanceolato-ovatis acutè serratis, subtus tomentosis, amentis filiformibus nodosis. Gron. Virg. 150. *Chesnut with oval spear-shaped leaves sharply sawed, which are woolly on their under side, and a slender knotted Catkin.* Castanea pumila, Virginiana, racemoso fructu parvo in singulis capsulis echinatis unico. Pluk. Alm. 90.— *THE CHINQUAPIN.*

The Chinquapin, or Dwarf Virginian Chesnut, is at present very rare in England: it is very common in the woods of America, where it seldom grows above twelve or fourteen feet high, and produces great plenty of nuts, which are, for the most part, single in each outer coat or capsule. This tree is very hardy, and will resist the severest of our winters in the open ground, but is very apt to decay in summer, especially if it be planted in very dry ground.— The nuts of these trees, if brought from America, should be put up in sand as soon as they are ripe, and sent to England immediately, otherwise they lose their growing quality, which is the reason this tree is at present so scarce with us; for not one seed in five hundred sent over ever grows, owing to the neglect of putting them up in this manner. When the nuts arrive, they should be put into the ground as soon as possible; and if the winter should prove severe, it will be proper to cover the ground with leaves, tan, or pease-haulm, to prevent the frost from penetrating the ground, so as to destroy the nuts. This sort of chesnut delights in a moist soil; but if the wet continues long upon the ground in winter, it is apt to kill the trees. This will take by inarching it upon the common sort, but the trees so raised seldom succeed well.

In the system of Linnæus the Chesnut is ranked in the class and order *Monœcia Polyandria*. The male flowers are collected in long catkins, and begin to open about the ninth of May. The buds usually appear about the fourteenth of April, and in six or seven days, the leaves will be quite out; they remain green till about the twelfth of October, when they assume a yellow colour.

The culture of this tree is as follows: Having provided a sufficient quantity of nuts, throw them into water, to know whether they are sound and good; the sound ones will sink to the bottom, whilst the others will show themselves to be faulty by swimming.

it, drenched for a night or more, in new milk: But without half this preparation they need only be put into the holes with the point upmost, as you plant Tulips. Pliny will tell you, they come not up, unleſs four or five be piled together in a hole; but that is false, if they be good, as you may presume all those to be which paſs the examination, nor will any of them fail; but being come up, they thrive best unremoved,

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This method should be always practised, that you may be certain of your seeds, whether they are of English or foreign growth. Indeed, in some cold damp soils, Chesnut-trees seldom perfect their seeds here; but where they do, our English trees produce very good seeds for the purpose; though it is generally allowed that those brought from Portugal and Spain are better.

The goodness of the nuts being thus proved, and having a sufficient quantity of ground properly prepared for the seminary, in the month of February let drills, about a foot distance from each other, be made acroſs this ground, about four inches deep, in which let the nuts be placed, at about four inches distance, throughout every drill. Some people recommend the eye of the nut to be placed uppermost, but there seems no neceſsity for such a caution; nature in all cases of sowing, pushes the germ upwards and the root downwards; and if we were, by way of experiment, to turn the germ of a new-sprouted bean downwards and the root upwards, the plant, from a kind of vegetable instinct impreſsed upon it by the Author of Nature, would counteract our intentions, and in a few days the germ and root would reasume their former positions.

In the spring, when the young plants appear, they should be kept clear from weeds; and as often as any weeds present themselves, they must be plucked up during the time the trees remain in the seminary, which ought to be two years from the time of sowing.

The plants, having stood in the seminary two years, must be carefully taken up, all the side-shoots taken off, and the tap-root shortened; then, having ground in the nursery double-dug, let them be planted in rows, two feet and a half or three feet asunder, and at least one foot and a half distant in the rows. The best time for doing this work is the latter end of February; for if they are planted in October, the severe frosts will be subject to throw the young plants out of the ground before winter is over. A year after they have been planted in the nursery, it will be very proper to cut every one of them down to within an inch of the ground; which will cause them to shoot vigorously with one strong and straight stem. Without this treatment, they are very subject to grow scraggy and crooked, and to make but slow progreſs; so that where they do not take well to the ground, and shoot irregularly, they should be cut down according to this direction; after which they will shoot strongly, and, in a short time, overtake those that have not undergone this operation, though planted some years before them.

In this nursery they may remain four or five years, when they will be fit to plant out, with no other pruning than taking off very strong side-branches, and such as have a tendency to make the tree forked. The only trouble required will be keeping the ground clear of weeds, and every winter digging between the rows.—After they are of a sufficient size to be planted out for standards, either in fields, clumps, wilderneſs

BOOK I. making a great stand for at least two years upon every transplanting; yet if needs you must alter their station, let it be done about November, and that into a light friable ground, or moist gravel; however, they will grow even in clay, sand, and all mixed soils, upon exposed and bleak places, and the pendent declivities of hills to the north, in dry airy places, and sometimes, though not so well, near marshes and waters;

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quarters, or avenues, they should be carefully taken out of the nursery; and having holes dug three feet square, and a foot and a half deep, with the turf chopt small at the bottom of each hole, let them be planted in the usual manner. After this, they may be turfed round to keep them steady against the winds. The best month for this work is October.

When these trees are designed for timber, they should remain unremoved; but when the fruit only is desired, it is certainly the better way to transplant them: for as transplanting is a check to the luxuriant growth of trees, so it is a promoter of their fructification.

If you design a large plantation of these trees for timber, after having two or three times ploughed the ground, the better to destroy the roots of weeds, you should draw thin furrows about six feet distance from each other, in which lay the nuts about ten inches asunder, covering them with earth about two inches deep; and when they come up, you must carefully clear them from weeds: the distance allowed between each row, is for the use of the horse-hoe, which will despatch a great deal of work in a short time; but it should be performed with great care, so as not to injure the young plants: therefore the middle of the spaces only should be cleaned with this instrument, and a hand-hoe must be used to clean between the plants in the rows, and also on each side, where it will be unsafe for the plough to be drawn: and in hand-hoeing, there must be great care taken not to cut the tender rind of the plants. If the following spring the spaces are carefully stirred with the plough, it will not only make the ground clean, but also loosen it, which will greatly promote the growth of the plants; and the oftener these ploughings are repeated, the cleaner will be the ground, and the greater will be the progress of the plants, which cannot be kept too clean while they are young. When these have remained three or four years, if the nuts succeed well, you will have many of these trees to remove, which should be done at the seasons before directed, leaving the trees distant about three feet in the rows; at which distance they may remain for three or four years more, when you should remove every other tree to make room for the remaining ones, which will reduce the whole plantation to six feet square, which will be distance enough for them to remain in, until they are large enough for poles, when you may cut down every other of these trees (making choice of the least promising) in order to make stools for poles, which, in ten or twelve years, will be strong enough to lop for hoops, hop-poles, &c. for which purposes they are preferable to most other trees; so that every tenth or twelfth year there will be a fresh crop, which will pay the rent of the ground, and all other incumbent charges, and, at the same time, a full crop of growing timber will be left upon the ground: but as the large trees increase in bulk, their distance of twelve feet

but they affect no other compost, save what their own leaves afford them, and are more patient of cold than heat. As for their sowing in the nursery, treat them as you are taught in the Walnut.

2. If you design to set them in winter or autumn, I counsel you to inter them within their husks, which, being every way armed, are a good

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square will be too small; therefore when they have grown to a size for small boards, you should fell every other tree, which will reduce them to twenty-four feet square, which is a proper distance for them to remain for good; this will give air to the under-wood (which by this time would be too much overhung by the closeneſs of the large trees) by which means that will be greatly encouraged, and the fall of the small timber will pay sufficient interest for the money at first laid out in planting, &c. with the principal also; so that all the remaining trees will be clear profit, as the under-wood, still continuing, will pay the rent of the ground, and all other expences.

I have here ventured to recommend the raising a wood of Chesnut-trees from the nut, by the authority, and nearly in the words of Mr. Miller; but Mr. Hanbury contends that it is much better to plant such a wood from the nursery. He says, "Where a wood "of these trees is wanted, they should be raised in the nursery way; and when the plants "are about five feet high, they will be of the properest size for the purpose; for they "will then not be so large as to require staking, nor yet so small but that they will be out "of the reach of hares, rabbits, &c. Therefore, as soon as the trees are about this height "in the nursery, let the ground designed for the wood be ploughed deep with a very strong "plough, that the uppermost and the best part of the soil may be laid as low as poſsible, "to be of greater nourishment to the tree, when it receives its tender fibres. The "distance these trees should be planted from one another ought to be two yards; and this "will be a proper distance for them to grow up to poles; when they should be cut down, "only leaving a sufficient number of the best and most thriving trees for timber. Thus, "whilst the latter are making their progreſs to a larger bulk, being left at a distance of "near twenty feet, the poles will, at the interval of fourteen years from the first planting, "reward the owner's toil with no inconsiderable profits; and if they are cut down within "about a foot of the ground, there will be stools for another crop of poles, which will "be ready for a second cutting in about ten years; so that every ten years the planter "will taste the sweets of his labour, while his expectations are still augmented, as to the "advantage of his family in after times. If the plantation is large, I would advise to begin "the first fall of poles so early, and to defer the latter so late, that the year after the last "fall, the stools of the first-cut poles shall have sent forth poles ready for a second cutting. "Thus the proprietor will not only enjoy the benefits of an annual sale, but the country "will not be glutted with too great a quantity of poles at a time, and consequently they "may be sold at a better price.

"Such are the directions I would give for raising a wood of these trees; which I take "to be better than planting the nuts, and letting them remain; not only because the plant "is then subject to a tap-root, which strikes directly into the ground beyond the reach

BOOK I.

protection against the mouse, and a providential integument. Pliny, lib. xv. cap. xxiii. from this natural guard, concludes them to be excellent food; and doubtleſs Cæsar thought so, when he transported them from Sardis first into Italy, whence they were propagated into France, and thence among us; another encouragement to make such experiments out of foreign countries. Some sow them confusedly in the furrow like the acorn, and govern them as the Oak; but then should the ground be broken up betwixt November and February; and when they spring, be cleansed and thinned two feet asunder, after two years growth: Likewise may copses of Chesnuts be wonderfully increased and thickened, by laying the tender and young branches; but such as spring from the nuts and marrons are best of all, and will thrive exceedingly, if (being let stand without removing) the ground be stirred, and loosened about their roots for two or three of the first years, and the superfluous wood pruned away; and indeed for good trees, they should be shriped up after the first year's removal; they also shoot into gallant poles from a felled stem: Thus will you have a copse ready for a felling, within eight years, which, besides many other uses, will yield you incomparable poles for any work of the garden, vineyard, or hop-yard, till the next cutting; and if the tree like the ground, it will, in ten or twelve years, grow to a kind of timber, and bear plentiful fruit.

3. I have seen many Chesnut-trees transplanted as big as my arm, their heads cut off at five and six feet height, but they came on at leisure.

" of nourishment, and consequently must in proportion grow slower, but also because the " expences will be leſs. While they are in the nursery, a vast quantity of them will " stand upon a small space of ground, and consequently be raised at a small expence; but " when the nuts are planted with a design to remain, the whole extent of the ground " intended for the wood must be kept clear of weeds till the plants are grown of a suf- " ficient size to defend themselves."—*Body of Planting, p.* 14.

The Chesnut will thrive on almost all soils and in all situations. It will grow best indeed, in a rich loamy land; but it will succeed very well on that which is gravelly, clayey, or sandy. All mixed soils are suitable to it, as well as exposed places, and the declivities of hills. Posts made of this tree are much more durable than Oak.

This tree had its name Castanea from a town of the name of Καστανις in Theſsaly, about which the Chesnut grew in great abundance. It has the same appellation in all the European languages. In German, it is CASTANIENBAUM; in Swedish and Danish, CASTANJETRÆE; in French, CHATAIGNIER; in Italian, CASTAGNO; in Spanish, CASTANO; in Portuguese, CASTANHEIRO; in Ruſsian, it is KESCHTAN.

The Horse Chesnut Tree.

J. Miller del & sc.

Published Jan.y 1st 1788. by A. Hunter, W.C. as the Act directs.

In such plantations, and all others for avenues, you may set them from thirty to ten feet distance, though they will grow much nearer, and shoot into poles, if, being tender, you cultivate them like the Ash, the nature of whose shade it resembles, since nothing affects much to grow under it. Some husbands tell me, that the young Chesnut-trees should not be pruned or touched with any knife or edge-tool for the first three or four years, but rather cropped or broken off, which I leave to farther experience; however, many forbear to top them when they transplant.

4. The Chesnut being graffed on the Walnut, Oak, or Beech, I have been told, will come exceedingly fair, and produce incomparable fruit; for the Walnut and Chesnut on each other, it is probable, but I have not yet made a full attempt. They also speak of inoculating cherries on the Chesnut-stock for a later fruit. In the mean-time, I wish we did more universally propagate the Horse-Chesnut, which being easily increased from layers, grows into a goodly standard, and bears a most glorious flower, even in our cold country. This tree, so called from its curing broken-winded horses, and other cattle, of coughs, is now all the mode for the avenues to their country palaces in France, as appears by the late Superintendant's plantation at Vaux. It was first brought from Constantinople to Vienna, thence into Italy, and so to France; but to us from the Levant more immediately, and flourishes so well, and grows so goodly a tree in competent time, that, by this alone, we might have ample encouragement to denizen other strangers amongst us. One inconvenience to which this beautiful tree is obnoxious, is, that it does not well resist impetuous and stormy winds without damage[c].

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[c] This is the ÆSCULUS *(HIPPO-CASTANUM)* floribus heptandris. Sp. Pl. 488. *THE HORSE-CHESNUT.* It is of the class and order Heptandria Monogynia.

The Horse-Chesnut is a tree of singular beauty; the leaves are large, fine, and palmated, and appear very early in the spring. It is naturally uniform in its growth, always forming its head into a regular parabola. In the spring it produces long spikes of rich and beautiful flowers.

This tree is a native of the East, and is said to have been brought into Europe in 1610; at which time also the Laurel was introduced into the English gardens: But we have reason to believe that this tree was brought from Constantinople, and made a denizen of England, almost an hundred years before the above-mentioned period.

The Horse-Chesnut is very proper to be planted for avenues or walks; but it is objected to by some, on account of its leaves falling off early in the autumn. But it should

BOOK I.

5. The Chesnut is, next the Oak, one of the most sought after by the carpenter and joiner. It hath formerly built a good part of our antient houses in the city of London, as does yet appear. I had once a very large barn near the city, framed entirely of this timber; and certainly the trees grew not far off, probably in some woods near the town: for, in that description of London, written by Fitz-Stephens, in the reign of Henry II. he speaks of a very noble and large forest which grew on the boreal part of it; *Proxime*, says he, *patet foresta ingens, saltus nemorosi ferarum, latebræ cervorum, damarum, aprorum, et taurorum sylvestrium*, &c. A very goodly thing it seems, and as well stored with all sorts of good timber as with venison and all kind of chase; and yet some will not allow the Chesnut to be a freeborn of this Island, but

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be considered that it shoots out proportionably earlier in the spring, which, together with its beautiful flowers, makes it an ornamental and desirable tree.

This tree is extremely well adapted to parks; not only because it grows to a large size, and forms a beautiful regular head, but on account of the quantity of nuts it produces, which are excellent food for deer in the rutting season: So that in parks where great numbers of deer are kept, I would recommend these trees to be planted in abundance. They are likewise very proper for the boundaries of open fields, to terminate views, &c. and though there are no deer to eat the nuts, yet the swine are equally delighted with them, and will fatten greatly with such provender.

The buds of this tree, before they shoot out leaves, become turgid and large; so that they have a good effect to the eye, by their bold appearance, long before the leaves appear: And what is peculiar to the Horse-Chesnut is, that as soon as the leading shoot is come out of the bud, it continues to grow so fast, as to be able to form its whole summer's shoot in about three weeks or a month. After this it grows little more in length, but thickens, and becomes strong and woody, and forms the buds for the next year's shoot. The flowers are in full blow about the twelfth of May, and on fine trees make a noble appearance.

This tree is propagated from the nut: In autumn, therefore, when the nuts fall, a sufficient quantity should be gathered. Some people recommend them to be sown immediately in drills; but others with more propriety, delay the sowing till the spring, by which means they will escape the ravages of the field-mouse. Previous to sowing they should be thrown into water, as directed in page 46, which will secure to the planter the certainty of a crop.

In the spring the plants will come up; and when they have stood one year they may be taken up, their tap-roots shortened, and afterwards planted in the nursery, and managed in the same manner as was directed for the Spanish Chesnut.

When they are of sufficient size to be planted out for good, they must be taken out of the nursery with care; let the great side-shoots and the bruised parts of the roots be taken off, and when planted out, let the holes be large, taking care that the top of the

of that I make little doubt[d]. The Chesnut affords the best stakes for palisades, and props for vines and hops, as I said before. It is good for mill-timber or water-works, or where it may lie buried; but if water touch the roots of the growing trees, it spoils both fruit and timber.— It is likewise observed, that this tree is so prevalent against cold, that, where they stand, they defend other plantations from the injuries of the severest frosts. I am sure, being planted in hedge-rows, *et circa agrorum itinera*, or for avenues to our country-houses, they are a magnificent and royal ornament. This timber also does well, if kept dry, for columns, tables, chests, chairs, stools, bedsteads; for tubs, and casks for wine, which it preserves with the least tincture of the wood of any whatsoever. If the timber be dipped in scalding oil, and well pitched, it becomes extremely durable, but otherwise, I cannot celebrate the tree for its sincerity, it being found that, contrary to the Oak, it will make a fair show outwardly when it is all decayed and rotten within; but this is in some sort recompensed, if it be true that the beams made of Chesnut-tree have this property, that, being somewhat brittle, they give warning and premonish the danger by a certain crackling, so as, it is said, to have CH. VIII.

root be nearly level with the ground. The fibres must be spread and lapped in the fine mould, and the turf worked to the bottom. A stake should be placed to keep them safe from the winds, and they must be fenced from the cattle till they are of a sufficient size to defend themselves. The best season for this work is October.——After the trees are planted, neither knife nor hatchet should come near them; but they should be left to Nature in the formation of their beautiful parabolic heads.

The Horse-Chesnut, like most other trees, delights most in good fat-land; but it will grow exceedingly well on clayey and marly grounds. I have seen large trees, luxuriant, and healthy, in very cold, barren, and hungry earth. In short, it may be planted in most places to the owner's satisfaction. It grows to a large size in a few years. The wood is chiefly used by the turner, and in the north is worth about sixpence a foot.

Of this genus there is another species titled by Linnæus ESCULUS *(PAVIA)* floribus octandris. Sp. Pl. 488. *THE SCARLET-FLOWERING HORSE-CHESNUT.* This is a tree of humble-growth, seldom exceeding fifteen feet in height. It grows naturally in Carolina, the Brasils, and in several parts of the East.

[d] In the sixty-first volume of the Philosophical Transactions, Dr. Ducarel opposes the opinion of the Hon. Daines Barrington, who, in the fifty-ninth volume of the same work, had asserted that "Chesnut-trees were not natives of this kingdom." I do not take upon me to say whether the Chesnut-tree be a native of the Southern parts of this island or not; but I am well informed that no such tree has ever been discovered in any of the natural woods north of Trent; and indeed it is most probable that it is not a native.

BOOK I. frighted those out of the baths at Antandro, whose roof was laid with this material, but which, Pliny says was of Hazel, very unlike it.—Formerly they made consultory staves of this tree; and the variegated rods which Jacob peeled to lay in the troughs, to impress a fancy in his father-in-law's conceiving ewes, are said to have been of this material. The coals are excellent for the smith, being soon kindled, and as soon extinguished; but the ashes of Chesnut-wood are not convenient to make a lye with, because it is observed to stain the linen. As for the fruit, it is better to beat it down from the tree some little time before it falls off of itself; thus the nuts will keep the better, or else you must kiln-dry them. But we give that fruit to our swine in England, which is amongst the delicacies of princes in other countries, and, being of the larger nut, is a lusty and masculine food for rustics at all times, and of better nourishment for husbandmen than cole and rusty bacon, yea, or beans to boot; instead of which, they boil them in Italy with their bacon; and, in Virgil's time, they eat them with milk and cheese[c]. The best tables in France and Italy make them a service, eating them with salt, in wine, or juice of lemon and sugar, being first roasted in embers on the chaplet; and, doubtless, we might propagate their use among our common people, (as of old the Βαλανοφάγοι,) being a food so cheap, and so lasting. In Italy they boil them in wine, and then smoke them a little; these they call anseri, or geese, I know not why: Those of Piedmont add fennel, cinnamon and nutmeg to their wine; but first they peel them. Others macerate them in rose-water. The bread of the flour is exceedingly nutritive; it is a robust food, and makes women well-complexioned, as I have read in a good author. They also make fritters of chesnut flour, which they wet with rose water, and sprinkle with grated parmigiano, and so fry them in fresh butter for a delicate. How we here use Chesnuts in stewed meats and beatille pies, our French cooks teach us; and this is in truth their very best use, and very commendable; for it is found that the eating of them raw, or in bread, as they do much in the Limosin, is apt to swell the belly, though without any other inconvenience that I can learn; and yet some condemn them.

[c] Tityrus, in his invitation to Melibœus, says,

——————Sunt nobis mitia poma,
Castaneæ molles, et prefsi copia lactis. ECL. I.

as dangerous for such as are subject to the gravel in the kidneys; and however cooked and prepared, flatulent, offensive to the head and stomach, especially to those who are subject to the cholick. The best way to preserve them, is to keep them in earthen veſsels in a cold place; some lay them in a smoak-loft, others in dry barley-straw, others in sand, &c. The leaves of the Chesnut-tree make very wholesome mattreſses to lie on, and they are good litter for cattle: But those leafy beds, for the crackling noise they make when one turns upon them, the French call *licts de parliament*. Lastly, the flour of Chesnuts, made into an electuary with honey, and eaten fasting, is an approved remedy against spitting of blood, and the cough: and a decoction of the rind of the tree, tinctures hair of a golden colour, esteemed a beauty in some countries. For other species, *vide* Raii Dendrolog. tom. iii.

CHAP. IX.

The WALNUT[t].

*Macrob. Saturn. Lib. ii. cap. xiv.

1. JUGLANS, *quasi Jovis glans**, the WALNUT. This is, of several sorts, the soft shell and the hard, the whiter, and the blacker grain; the black bears the worst nut, but the timber is much to be preferred, and we might propagate more of them if we were careful to procure them

[t] Formerly the English Walnut-tree was much propagated for its wood; but since the importation of Mahogany and the Virginia Walnut, it has considerably decreased in reputation. The species are:

1. JUGLANS *(REGIA)* foliolis ovalibus glabris subserratis subæqualibus. Lin. Sp. Pl. 1415. *Walnut with oval small leaves, which are smooth, sawed, and equal.* Nux juglans. Dod. Pempt. 816. *THE COMMON WALNUT.*

Of the common Walnut there are several varieties, which are distinguished by the following titles: the large Walnut, the thin-shelled Walnut, the French Walnut, the late-ripe Walnut, and the double Walnut. The nuts from these respective varieties do not always produce fruit of their own kinds, for which reason there ought to be no dependence upon the trees raised from nuts till they have shown their fruit.

2. JUGLANS *(NIGRA)* foliolis quindenis lanceolatis serratis, exterioribus minoribus, gemmulis super axillaribus. Lin. Sp. Pl. 1415. *Walnut-tree, with spear-shaped, sawed, small leaves, and the exterior ones smaller.* Nux juglans Virginiana nigra. Catesb. Car. *BLACK VIRGINIA WALNUT.*

This grows to a large size in North America. The leaves are composed of five or six pair of spear-shaped lobes, which end in acute points, and are sawed on their edges; the lower pair of lobes are the least, the others gradually increase in their size to the top, where they pair at the top, and the single lobe which terminates the leaf, are smaller; these leaves, when bruised, emit a strong aromatic flavour, as do also the outer covers of the nuts, which are rough, and rounder than those of the common Walnut. The shell of the nut is very hard and thick, and the kernel small, but very sweet. The following is a variety of this species:

JUGLANS foliolis cordato-lanceolatis infernè nervosis, pediculis foliorum pubescentibus. *Walnut with heart spear-shaped leaves, having many veins on their under side, and downy foot-stalks to the leaves.* Juglans nigra, fructu oblongo profundissime inseulpto. Hort. Chels. *BLACK WALNUT, WITH AN OBLONG FRUIT VERY DEEPLY FURROWED.*

This sort grows naturally in North America, where the trees grow to a large size. The leaves are composed of seven or eight pair of long heart-shaped lobes, broad at their base, where they are divided into two round ears, but terminate in acute points. The fruit is very long. The shell is deeply furrowed and very hard. The kernel is small, but well flavoured.

The Wallnut Tree.

J. Miller del. & sc.

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out of Virginia, wherethey abound, and bear a squarer nut; of all others the most beautiful and best worth planting: Indeed, had we store of these, we should soon despise the rest; yet those of Grenoble come in the next place, and are much prized by our cabinet-makers. At all events, be sure to plant from young and thriving trees, bearing full and plump kernels. It is said that the Walnut kernel wrapped in its own leaf, being carefully taken out of its shell, brings a nut without shell; but this is a trifle. The best way to raise them, is to set them as you do the Chesnut, being planted of the nut, or set at the distance you would have them stand; for which they may be prepared by beating them off the

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3. JUGLANS *(ALBA)* foliolis septenis lanceolatis serratis: impari sessili. Lin. Sp. Pl. 1415. Nux juglans alba Virginiensis. Park. Theat. 1414. *WHITE VIRGINIA WALNUT;* called *HICKERY NUT.*

This is very common in most parts of North America, where it is called Hickery Nut. The leaves are composed of two or three pair of oblong lobes, terminated by an odd one; these are of a light green, and sawed on their edges; the lower pair of lobes are the smallest, and the upper the largest. The fruit is shaped like the common Walnut; but the shell is not furrowed, and is of a light colour. The two following are varieties of this species:

1. JUGLANS foliolis cuneiformibus serratis, exterioribus majoribus. *Walnut with wedge-shaped leaves which are sawed, the outer being the largest.* Juglans alba fructu minori cortice glabro. Clayt. Flor. Virg. *WHITE WALNUT WITH A SMALLER FRUIT, AND A SMOOTH BARK.*

The leaves of this sort are composed of two pair of lobes, terminated by an odd one; these are narrow at their base, but broad and rounded at their ends; they are sawed on their edges, and are of a light green. The nuts are small, have a smooth shell, and are very hard and white.

2. JUGLANS foliolis lanceolatis serratis glabris subæqualibus. *Walnut with smooth, spear-shaped, sawed leaves, which are equal.* Juglans alba fructu ovato compresso, nucleo dulci, cortice squamoso. Clayt. Flor. Virg. *White Walnut with an oval compressed fruit, a sweet kernel, and a scaly bark;* called in America *SHAG-BARK.*

This kind grows naturally in North America, where it rises to a middling stature. The leaves are composed of three pair of smooth spear-shaped lobes, of a dark green colour, sawed on their edges and ending in acute points. The fruit is oval, the shell white, hard, and smooth, the kernel small, but very sweet. The young shoots of the tree are covered with a very smooth brownish bark, but the stems and older branches have a rough scaly bark, from whence it has the appellation of Shag-bark.

4. JUGLANS *(CINEREA)* foliolis undenis lanceolatis basi alterâ breviore. Lin. Sp. Pl. 1415. *THE PENNSYLVANIA WALNUT-TREE.*

BOOK I. tree, as was prescribed of the Chesnut, some days before they quit the branches of themselves, and keeping them in their husks, or without them, till spring; or by bedding them, being dry, in sand or good earth, till March or earlier, from the time they fell, or were beaten off the tree: But if before, they should be set with husks and all upon them; for the extreme bitterneſs thereof is most exitial and deadly to worms; or it were good to strew some furzes, broken or chopped small, under the ground amongst them, to preserve them from mice and rats, when their

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This species seldom exceeds the height of thirty feet. The leaves are long, being composed of eleven pair of folioles, besides the odd one, with which they are terminated. The flowers are yellowish, and come out at the same time with the others, and are succeeded by a small, roundish, hard-shelled fruit.

The WALNUT, in the Linnæan system, belongs to the claſs and order *Monoecia Polyandria*. The flowers begin to open about the middle of April, and are in full blow by the middle of May, before which time the leaves are fully displayed.

These trees are propagated by planting their nuts, which should be gathered from trees of the best kinds. After remaining in the seminary two years, they should be transplanted into the nursery, where they should continue till they are about five feet in height, when they may be planted out where they are to remain. But as these trees do not bear transplanting when of a large size, it will be adviseable to plant a good number at the distance of twelve feet from each other; and in this state they should remain till they have shown their fruit, when those only of the desired kind should be permitted to stand. In this place it will be proper to remark, that the trees will fruit much sooner upon a thin lime-stone soil, than upon one that is rich and deep. So that when it is desired that the trees shall fruit at an early age, we must avoid planting them upon a rich soil. For the manner of sowing the nuts see p. 44.

All the sorts of Walnuts which are intended for timber, should be sown in the places where they are to remain, in order to preserve the tap-root; for, when once broken, the tree ceases to aspire, but inclines to divaricate into branches, in which state it is more productive of fruit than of timber.

In transplanting these trees, you should be spairing of the knife both to their roots and branches; nor should you be too busy in lopping or pruning the branches when grown to a large size, for it often causes them to decay; but when there is a neceſsity for cutting off any of their branches, the operation should be done early in September, (for at that season the trees are not so subject to bleed,) that the wound may heal over before the winter. The branches should always be cut off quite close to the trunk, otherwise the stump, which is left, will decay and rot the body of the tree.

The best season for transplanting these trees is as soon as the leaves begin to decay, at which time, if they are carefully taken up, and their branches preserved entire, there will be little danger of their succeeding, although they are eight or ten years old; but, as before observed, these trees will not grow so large, or continue so long, as those which

shells begin to wax tender; especially if, as some, you supple them a little in warm cow's milk; but being treated as before, you will find them already sprouted, and have need only to be planted where they are to abide; because, as we said long since, they are most impatient of transplanting: However, if there be an absolute neceſsity of removing, let your tree never be above four years old, and then by no means touch the head with your knife, nor cut away so much as the very tap-root, being so old, if you can well dispose of it; since being of a pithy and CHAP. IX.

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are removed young. This tree delights in a firm, rich, loamy soil, or such as is inclinable to chalk or marl; and will thrive very well in stony ground, and on chalky hills, as may be seen by those large plantations near Leatherhead, Godstone, and Carshalton in Surrey, where great numbers of these trees are planted upon the downs, which annually produce large quantities of fruit, to the great advantage of their owners.

These trees should not stand at a distance of leſs than forty feet, especially if regard be had to their fruit; though when they are only designed for timber, if they stand nearer, it promotes their upright growth. The black Virginia Walnut is much more inclinable to grow upright than the common sort, and the wood being of a more beautiful grain, renders it better worth cultivating. The Walnut-tree is used by cabinet-makers for bedsteads, chairs, tables, and cabinets; and is one of the most durable woods for those purposes of English growth, being leſs liable to be infected with insects than most other kinds; (which may proceed from its extraordinary bitterneſs); but it is not proper for buildings of strength, it being of a brittle nature, and exceedingly subject to break short, though it commonly gives notice by its crackling some time before it breaks.

Virgil, from the appearance that this tree puts on in the spring, draws his prognostic of the future harvest:

Contemplator item, cum se nux plurima sylvis
Induet in florem, et ramos curvabit olentes:
Si superant fœtus, pariter frumenta sequentur.
Magnaque cum magno veniet tritura calore.
At si luxuria foliorum exuberat umbra,
Nequicquam pingues palea teret area culmos. GEORG. I.

The fruit of the Walnut-tree was formerly strewed at weddings:

————tibi ducitur uxor:
Sparge, marite, nuces.———— VIRG. ECL. viii.

And this ceremony was insituted to show that the bridegroom had left off his boyish amusements, *nuces relinquere* implying the same:

Da nuces pueris iners,
Concubine: satis diu
Lusisti nucibus: lubet
Jam servire Thalaſsio.
Concubins, nuces da. CATULL.

BOOK I.

hollow substance, the least diminution, or bruise, will greatly endanger the killing: But see here what we have said of the Chesnut. I have been told, that the very tops and palish buds of this tree, when it first sprouts, though as late as April, will take hold of the ground, and grow to an incredible improvement; but first they steep them in milk and saffron: however this attempt did not succeed with us, yet it may be propagated by a branch slipped off with some of the old wood, and set in February. An industrious and very experienced husbandman told me, that if they be transplanted as big as one's middle, it may be done safer than when younger: I do only report it. What they hint of putting a tile-shard under the nuts when first set, to divaricate and spread the roots, (which are otherwise apt to penetrate very deep,) I like well enough. It is certain they will receive their own cions being graffed, and that it does improve the fruit. The best compost is the strewing of ashes at the foot of the trees; the salt whereof being washed into the earth, is the best dreſsing, whilst the juice of the fallen leaves, though it kill the worm, is noxious to the root. This tree does not refuse to thrive even among others, and in great woods, provided you shrip up the collateral arms.

2. The Walnut delights in a dry, sound, and rich land, especially if it incline to a feeding chalk or marl; and where it may be protected from the cold, (though it affects cold rather than extreme heat,) as in great pits, valleys, and highway sides; also in stony-grounds, if loamy, and on hills, especially chalky; likewise in corn-fields. Thus, Burgundy abounds with them, where they stand in the midst of goodly wheat-lands, at sixty and an hundred feet distance, and so far are they from hurting the crop, that they are looked upon as great preservers by keeping the ground warm, nor do the roots hinder the plough. Whenever they fell a tree, which is only the old and decayed, they always plant a young one near it; and in several places betwixt Hanaw and Frankfort in Germany, no young farmer whatsoever is permitted to marry a wife, till he bring proof that he hath planted, and is a father of such a stated number of Walnut-trees; and the law is inviolably observed to this day, for the extraordinary benefit which this tree affords the inhabitants. In truth, were this timber in greater plenty amongst us, we should have far better utensils of all sorts for our houses, as chairs, stools, bedsteads, tables, wainscot, cabinets, &c. instead of the more vulgar Beech, subject to the worm, weak and unsightly; but which, to counterfeit, and deceive the unwary, they

wash over with a decoction made of the green husks of Walnuts, &c. I say, had we store of this material, especially of the Virginian, we should find an incredible improvement in the more stable furniture of our houses, as in the first frugal and better days of Rome. CHAP. IX.

> Illa domi natas, nostraque ex arbore mensas
> Tempora viderunt: hos lignum stabat in usus,
> Annosam si fortè nucem dejecerat Eurus. JUV.

For if it had been cut in that season, it would not have proved so sound, as we show in our chapter of felling. It is certain, that the *Mensæ Nucinæ* were once in price even before the Citron, as Strabo notes; and nothing can be more beautiful than some planks and works which I have beheld of it, especially that which comes from Grenoble, of all others the most beautiful and esteemed.

3. They render most graceful avenues to our country dwellings, and do excellently near hedge-rows; but had need be planted at forty or fifty feet interval, for they affect to spread both their roots and branches. The Bergstras (which extends from Heidelberg to Darmstadt) is all planted with Walnuts; for so, by another antient law, the Bordurers were obliged to nurse up and take care of them, and that chiefly for their ornament and shade, so as a man may ride for many miles about that country under a continued arbour, or close walk; the traveller both refreshed with the fruit and the shade, which some have causelessly defamed for its ill effects on the head [s], for which the fruit is a specific and a notable signature; although I deny not, but the scent of the fallen leaves, when they begin to be damped with lying, may emit somewhat a heady steam, which to some has proved noxious, but not whilst they were fresh and lively upon the trees. How would such public plantations improve the glory and wealth of a nation! But where shall we find the spirit among our countrymen? Yes, I will adventure to instance in those plantations of Sir Richard

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s. In Italy, sleeping under trees was thought a great luxury:

> ——molesque sub arbore somni
> Non absunt. VIRG.

On which account we must suppose that they were choice in the kind of trees most friendly to people overcome with sleep. The shade of the Walnut was held to be particularly unwholesome. Gravis et noxia, etiam capiti humano, omnibusque juxta satis. PLIN.

BOOK I. Stidolph, upon the Downs near Leatherhead in Surrey; Sir Robert Clayton, at Morden, near Godstone, (once belonging to Sir John Evelyn) and so about Caſsaulton, where many thousands of these trees do celebrate the industry of the owners, and will certainly reward it with infinite improvement, as I am aſsured they do already, and that very considerably; besides, they afford an ornament to those pleasant tracts, for some miles in circumference. There was lately, and for ought I know as yet, an avenue of four leagues in length, and fifty paces in breadth, planted with young Oaklings, as straight as a line, from the city of Utrecht to Amersfort, affording a most goodly prospect; which reminds me of what Sorbiere tells in a sceptical discourse to Monsieur de Martel, speaking of the readiness of the people in Holland to furnish and maintain whatsoever may conduce to the public ornament, as well as convenience, "that their plantations of these and the like trees, even in their "very roads and common highways, are better preserved and entertained "(as I myself have likewise been often an eye-witneſs) than those about "the houses and gardens of pleasure belonging to the nobles and gentry "of most other countries;" and in effect it is a most ravishing object, to behold their amenities in this particular. "With us," says he, speaking of France, "they make a jest at such political ordinances, by running down "these public and useful ornaments, if haply some more prudent magistrate "do at any time introduce them." Thus, in the reign of Henry IV. (during the superintendency of Mons. de Sully[h]) there was a resolution of adorning all the highways of France with Elms, &c. but the rude and mischievous peasants did so hack, steal, and destroy what they had begun, that they were forced to desist from the thorough prosecution of the design; so as there is nothing more exposed, wild, and leſs pleasant, than the common roads of France for want of shade, and the decent limits which these

[h] This celebrated Statesman was a great encourager of agriculture; he stiles it one of the *breasts* from whence the state must draw its nourishment. Instructing by precepts, and stimulating by rewards, he prevailed upon his countrymen to cultivate the art; but their industry was of short duration: The public troubles soon put an end to Arts, Agriculture, and Commerce. Colbert conceived a different notion of policy; looking upon manufactures and commerce as the sinews of the state, he gave all poſsible encouragement to the Artizan and the Merchant,—but forgot that the Manufacturer must eat his bread at a moderate price. The Farmer being discouraged, the neceſsaries of life became dear; —the public granaries were ill stored;—manufactures languished;—commerce drooped;— a numerous army soon consumed the scanty harvest; and, in a short time, Industry fell a sacrifice to the ill-judged policy of the Minister.

sweet and divertisant plantations would have afforded. Not to omit that political use, as my Lord Bacon hints it, where he speaks of the statues and monuments of brave men, and such as had well deserved of the public, erected by the Romans even in their highways; since, doubtleſs, such noble and agreeable objects would exceedingly divert, entertain, and take off the minds and discourses of melancholy people and pensive travellers, who having nothing but the dull and inclosed ways to cast their eyes on, are but ill conversation to themselves and others, and, instead of celebrating, censure their superiors. It is observed by a curious person, an industrious friend of mine, that the sap of this tree rises and descends with the sun's diurnal course, (which it visibly slackens in the night,) and more plentifully at the root on the south-side, though those roots cut on the north were larger, and leſs distant from the body of the tree; and not only distilled from the ends, which were next the stem, but from those that were cut off and separated, which was never observed to happen in the Birch, or other sap-yielding trees.

Mr. Oldenburgh* speaks of one of the present Kings in Europe, who drinks much of the juice of this tree, and finds great benefit thereby.

*Phil. Trans. vol. iii. No. xl. p. 802.

4. What universal use the French make of the timber of this sole tree, for domestic affairs, may be seen in every room both of poor and rich. It is of singular account with the joiner, for the best grained and coloured wainscot; with the gunsmith, for stocks; with the coach-maker, for wheels and the bodies of coaches; in New England, they make hoops and bows for want of Yew; the drum-maker uses it for rims, the cabinet-maker for inlaying, especially the firm and close timber about the root, which is admirable for flecked and chambleted works, some wood especially, as that

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To raise the island of Great Britain to its wonted splendour, and to give energy and vigour to the state, our Rulers, ere it be too late, should in the most public manner encourage the cultivators of the earth:

> In antient times, the sacred plough employ'd
> The kings, and awful fathers of mankind:
> And some, with whom compar'd your insect-tribes
> Are but the beings of a summer's day,
> Have held the scale of Empire, rul'd the storm
> Of mighty war; then, with unweary'd hand,
> Disdaining little delicacies, seiz'd
> The plough, and greatly independent liv'd. THOMSON.

BOOK I. which we have from Bologne, New England, and Virginia (where there are three or four sorts, differing in leaf, fruit, and stature,) very black of colour, and so admirably streaked, as to represent natural flowers, landscapes, and other fancies. To render this wood the better coloured, joiners put the boards into an oven after the batch is forth, or lay them in a warm stable; and when they work it, polish it over with its own oil very hot, which makes it look black and sleek, and the older it is, the more estimable; but then it should not be put in work till thoroughly seasoned, because it will shrink beyond expectation. It is only not good to confide in it much for beams or joists, because of its brittleneſs, yet of which, it is observed to give timely notice, like the Chesnut, by the crackling before it breaks. Besides the uses of the wood, the fruit, with husk and all, when tender and very young, is used for preserves (being condited in separate decoctions) by our curious Ladies. It makes also food and oil; this last is of extraordinary use with the painter, in whites, and other delicate colours, also for gold-size and varnish; and with this they polish walking-staves, and other works which are wrought in with burning. They fry with it in some places, and eat it instead of butter in Berry, where they have little or none good; and therefore they plant infinite numbers of these trees all over that country: The use of it to burn in lamps is common there. The younger timber is held to make the better-coloured work, and so the Oak, but the older more firm and close, is finer chambleted for ornaments; and the very husks and leaves being macerated in warm water, and that liquor poured on the carpet of walks and bowling-greens, does infallibly kill the worms, without endangering the graſs[1]; not to mention the dye which is made of this lixive, to colour wool, woods, and hair, as of old they used it. The water of the husks is sovereign against all pestilential infections, and that of the leaves to mundify and heal inveterate ulcers. That which is produced of the thick shell, becomes best timber; that of the thinner, better fruit. Columella has sundry excellent rules how to ascertain and accelerate the growth of this tree, and to improve its qualities; and I am aſsured, that having

[1] There is nothing *peculiarly* noxious to worms in the bitter decoction of Walnut leaves. Worms cannot bear the application of any thing bitter to their bodies, which is the reason that bitters, such as Gentian, are the best destroyers of worms lodged in the bowels of animals. Worms are seldom observed in the intestines of the human body, excepting in cases where the bile is either weak, or deficient in quantity.

been graffed on the Ash, though others say no insition improves it, it thrives exceedingly, becomes a handsome tree, and, what is more estimable, bears its fruit within four years; all which I recommend to the farther industrious. The green husk dried, or the first peeping red buds and leaves reduced to powder, serves instead of pepper, to condite meats and sauces. It is thought better to cudgel off the fruit, when dropping ripe, than to gather it by hand; and that the husk may open, lay them by in a dry room, sometimes turning them with a broom, but without washing, for fear of mouldiness. In Italy they arm the tops of long poles with nails and iron for the purpose, and believe the beating improves the tree; which I no more believe, than I do that discipline would reform a Shrew. Those nuts which come easily out of their husks, should be laid to mellow in heaps, and the rest exposed in the sun, till the shells dry, else they will be apt to perish the kernels: some again preserve them in their own leaves, or in a chest made of Walnut-tree wood, others in sand, especially if you will preserve them for a seminary: Do this in October, and keep them a little moist, that they may spear, to be set early in February. Thus after two years they may be removed at a yard asunder, cutting the tap-root and side-branches, but sparing the head; and being two yards high, bud, or remove them immediately. Old nuts are not wholesome till macerated in warm and almost boiling water; but if you lay them in a leaden pot, and bury them in the earth, so as no vermine can attack them, they will keep marvellously plump the whole year about, and may easily be blanched[k]. In Spain they use to strew the gratings of old and hard nuts, first peeled, into their tarts and other meats. For the oil, one bushel of nuts will yield fifteen pounds of peeled and clear kernels, and that half as much oil, which the sooner it is drawn, is the more in quantity, though the drier the nut, the better in quality; the lees, or marc of the pressing, is excellent to fatten hogs with. After the nuts are beaten down, the leaves should be sweeped into heaps, and carried away, because their extreme bitterness impairs the ground, and, as I am assured, prejudices the trees: The green husks boiled, make a good colour to dye a dark yellow, without any mixture; and the distillation of its leaves with honey and urine, makes

[k] I have kept Filberts quite fresh, for near twelve months, by burying them in pots some feet under ground. The same may probably be done with Walnuts.

hair spring on bald heads. Besides its use in the famous Salernitan antidote[1], if the kernel, a little masticated, be applied to the bite of a suspected mad dog, and when it has lain three hours, be cast to poultry, they will die if they eat of it. In Italy, when a countryman finds any pain in his side, he drinks a pint of the fresh oil of this nut, and finds immediate ease. And more famous is the wonderful cure which the fungous substance, separating the lobes of the kernel, pulverized and drank in wine, in a moderate quantity, did perform upon the English army in Ireland afflicted with a Dysentery, when no other remedy could prevail. The juice of the outward rind of the nut makes an excellent gargle for a sore throat: The kernel being rubbed upon any crack or chink of a leaky or crazy veſsel, stops it better than either clay, pitch, or wax. In France they eat them blanched and fresh, with wine and salt, having first cut them out of the shells before they are hardened, with a short broad braſs knife, because iron rusts; and these they call Cerneaux, from their manner of scooping them out. Lastly, of the fungus emerging from the trunk of an old tree, and indeed some others, is made touchwood, artificially prepared in a lixivium, or lye, dried, and beaten flat, and then boiled with salt-petre, to render it apter to kindle. The tree wounded in the spring, yields a liquor, which makes an artificial wine. For other species, see Mr. Ray's Dendrolog. tom. iii. p. 5, 6.

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[1] Allia, ruta, pyra, et raphanus, cum theriaca, *nux*,
Præstant antidotum contra lethale venenum. SCHOL. SALERN.

The White Beam Tree.

J. Miller del. & sc.

Publish'd June 1st 1770 by A. Hunter & Co. as the Act directs

CHAP. X.

The SERVICE[m].

1. SORBUS, the SERVICE-TREE (of which there are four sorts) is raised of the chequers, or berries, which being ripe, that is rotten, about September, and the pulp rubbed off clean from the stones in dry sand, and so kept till after Christmas, may be sown like Beech-mast, and

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[m] Of the WILD SERVICE there are numerous species:

1. CRATÆGUS *(ARIA)* foliis ovatis inæqualiter serratis, subtus tomentosis. Lin Sp. Pl. 681. *Service with oval leaves unequally sawed, and woolly on their under side.* Cratægus folio subrotundo, serrato, subtus incano. Tourn. Inst. R. H. 633. Aria. Dalech. Hist. 202.—Sorbus Alpina. Bauh. Hist. i. p. 65. *THE WHITE-BEAM, or WHITE-LEAF TREE.*

This tree rises to the height of thirty feet, and grows naturally upon the chalky hills of Kent, Surrey, and Sussex. The young shoots have a brown bark covered with a mealy down.—The leaves are oval, of a light green colour upon their upper side, but white on their under, having many prominent transverse nerves running from the midrib to the border. They are unequally serrated. The flowers are produced at the end of the branches in May.—These grow upon mealy foot-stalks, and are succeeded by red berries which ripen in autumn.

2. CRATÆGUS *(TORMINALIS)* foliis cordatis septangulis: lobis infimis divaricatis. Lin. Sp. Plant. 681. *Service with heart-shaped leaves, having seven angles, whose lower lobes spread asunder.* Cratægus foliis cordatis acutis: lacinulis acutis serratis. Hort. Cliff. 187. Mespilus, apii folio, sylvestris non spinosa, seu Sorbus Torminalis. Bauh. Pin. 454. Sorbus Torminalis et Cratægus Theophrasti. Bauh. Hist. i. p. 63. *THE MAPLE-LEAVED SERVICE.*

This sort grows naturally in many parts of England, and is chiefly found upon strong soils; it formerly grew in great plenty in Cane-Wood, near Hampstead; and lately there were some young trees growing in Bishop's-Wood, near the same place: In many parts of Hertfordshire there are large trees now growing. It rises to the height of forty or fifty feet, with a large trunk, spreading at the top into many branches, so as to form a large head. The young branches are covered with a purplish bark, marked with white spots, and are garnished with leaves placed alternately, standing on pretty long foot-stalks; these are cut into many acute angles, like those of the Maple-tree, and are near four inches long, and three broad in the middle, having several smaller indentures toward the top, of a bright green on their upper side, but a little woolly on their under. The flowers are produced in large bunches toward the end of the branches; they are white, and shaped like those of the Pear-tree, but smaller,

BOOK I. educated in the nursery like the Chesnut. It is reported that the sower never sees the fruit of his labour; either for that it bears only being very old, or that men are commonly so before they think of planting trees: But this is an egregious mistake; for these come very soon to be trees, and, being planted young, thrive exceedingly; I have likewise planted them as big as my arm successfully. The best way is therefore to pro-

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and stand upon longer foot-stalks; these appear in May, and are succeeded by roundish compressed fruit, which are shaped like large haws, and ripen late in autumn, when they are brown; and if kept till they are soft, in the same way as medlars, they have an agreeable acid flavour. The fruit of this tree is sold in the London markets in autumn.

3. CRATÆGUS *(coccinea)* foliis ovatis repando-angulatis serratis glabris. Lin. Sp. Pl. 682. *Service with oval, smooth, sawed leaves, having angles.* Mespilus, apii folio, Virginiana, spinis horrida, fructu amplo coccineo. Pluk. alm. 249. *The virginian thorn*, commonly called *cockspur thorn*.

The Virginian Cockspur-thorn will grow to about twenty feet high. It rises with an upright stem, irregularly sending forth branches, which are smooth, and of a brownish colour, spotted thinly with small white spots. It is armed with thorns that resemble a cockspur, which gives it the appellation of Cockspur-thorn. In winter, the leaf-buds appear large, turgid, and have a bold and pleasant look among others of different appearances.—In summer, this tree is very delightful. The leaves are oval, angular, serrated, smooth, and bend backwards. They are about four inches long, and three and a half broad; have five or six pair of strong nerves running from the midrib to the border; and die to a brownish red colour in the autumn. The flowers are produced in very large umbels, making a noble show in May, and are succeeded by large fruit, of a bright red colour. The principal varieties of this species are; The Cockspur-hawthorn with many thorns; the cockspur with no thorn; the cockspur with eatable fruit.

4. CRATÆGUS *(crus galli)* foliis lanceolato-ovatis serratis glabris, ramis spinosis.—Lin. Sp. 682. *Service with oval, spear-shaped, sawed leaves, and prickly branches.* Mespilus aculeata pyrifolia denticulata splendens, fructu insigni rutilo, Virginiensis. Pluk. Alm. 249. *Virginian l'azarole.*

This species will grow to be near twenty feet high. The stem is robust, and covered with a light-coloured bark. The branches are produced without order; are of a dark-brown colour, and possessed of a few long sharp thorns. The leaves are spear-shaped, oval, smooth, and serrated; of a thickish consistence, and often remain on the tree the greatest part of the winter. Each separate flower is large; but as few of them grow together, the umbels they form are rather small. They come out in May, and are succeeded by large dark red-coloured fruit, which ripens late in the autumn. The varieties of this species are; the Pear-leaved Thorn; the Plum-leaved Thorn, with very long strong spines, and large fruit; the Plum-leaved Thorn, with short spines and small fruit.

The Wild Service Tree.

J. Miller del. & Sculp.

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pagate them of suckers, of which they put forth enough, as also of sets, and may be budded with great improvement. They delight in reasonably good stiff ground, rather inclining to cold than over hot; for in places which are too dry, they never bear kindly. The Torminalis (so called for its effects against gripings in the bowels) is the kind most frequent with us; for those of the narrower and lefs-indented leaf, are

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5. CRATÆGUS *(AZAROLUS)* foliis obtusis subtrifidis sub-dentatis. Lin. Sp. Pl. 683.—*Service with obtuse, trifid, indented leaves.* Mespilus Apii folio laciniato. C. B. P. 453.—Commonly called *L'AZAROLE.*

This grows naturally in Italy and the Levant, where the fruit is served up to table with the desert; it has a strong stem rising twenty feet high, having many strong irregular branches, covered with a light-coloured bark; the leaves are in shape somewhat like those of the common Hawthorn, but are much larger, have broader lobes, and are of a paler colour; the flowers come out in small clusters from the side of the branches, and are in shape like those of the common Hawthorn, but much larger; as is also the fruit, which when fully ripe has an agreeable acid taste, for which it is esteemed by the inhabitants of the countries where it grows naturally. The following are varieties of this species; Azarole, with strong thorns; Azarole, with no thorns; Jagged-leaved Azarole; Oriental Medlar.

6. CRATÆGUS *(OXYACANTHA)* foliis obtusis subtrifidis serratis. Lin. Sp. Pl. 683.—*Service with obtuse, trifid, sawed leaves.* Mespilus, Apii folio, sylvestris spinosa, s. Oxyacantha. C. B. P. 454. *THE COMMON WHITE-THORN.*

This useful and well-known species forms the hedges that surround the cultivated lands of this kingdom, making an impenetrable fence when orderly and regularly attended to. It has the following varieties: The Large Scarlet Hawthorn; the Yellow Haw; the White Haw; the Maple-leaved Hawthorn; the Double-blofsomed Hawthorn; and the Glastonbury Thorn. The Large Scarlet Hawthorn is a beautiful variety of the common Haw. Its fruit is exceedingly large, oblong, perfectly smooth, and of a bright scarlet. The Yellow Haw is a most exquisite plant. The buds at their first coming out in the spring, are of a fine yellow, and the fruit is of a golden colour. The tree is a great bearer, and retains its fruit all winter, which makes it acceptable in plantations of every kind. It was originally brought from Virginia, and no collection of hardy trees should be without it.——The White Haw is but a paltry tree, when compared with the former. It hardly ever grows to the height of the Common Hawthorn, is an indifferent bearer, and the fruit is small, and of a very bad white.—The Maple-leaved Hawthorn will grow to be near twenty feet high, and has very few thorns. The leaves are larger than the Common Hawthorn, resembling those of the Maple, and are of a whitish green colour. The flowers are produced in large bunches, in June, and are succeeded by a remarkable fruit, of a shining red, which looks beautiful in the winter. The Double-blofsomed Hawthorn produces a full flower, and is one of the sweetest ornaments in the spring. Nature seems to have peculiarly designed this sort for the pleasure-garden; for though it be the Common Hawthorn only, with the flowers doubled, yet it may be kept down to what size the owner pleases; so that it is not only suitable for wilderneſs quarters, shrubberies, and the like, but it is also proper for small gardens, where

BOOK I

not so common in England as in France, bearing a sort of berry of the pear-shape, and is there called the Cormier. This tree may be graffed either on itself or on the White-thorn and Quince. To this we might add the Mespilus or Medlar, being an hard wood, and of which I have seen very beautiful walking-staves. But there is yet a rare kind of Service-tree, frequent in Germany, which we find not in our woods; and they speak of another sort, which bears poison-berries.

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a tree or two only can be admitted. These beautiful double flowers come out in large bunches, in May, and the tree is so good a bearer, that it often appears covered with them. Their colour, at their first appearance, is a delicate white: They afterwards die to a faint red colour, and are frequently succeeded by small imperfect fruit. The Glastonbury Thorn differs in no respect from the Common Hawthorn, only that it sometimes flowers in the winter. It is said to have been originally the staff of Joseph of Aramathea. He, according to the tradition of the abbey of Glastonbury, attended by twelve companions, came over into Britain, and founded, in honour of the Blefsed Virgin, the first Christian Church in this island. As a proof of his mifsion, he is said to have stuck his staff into the ground, which immediately shot forth and blofsomed. By some credulous people this tree was long thought to put forth its blofsoms on Christmas-day; but this sanctified deceit is now sunk into discredit, even with the meanest of the vulgar.

7. CRATÆGUS *(TOMENTOSA)* foliis cuneiformi-ovatis serratis subangulatis subtus villosis, ramis spinosis. Lin. Sp. Pl. 682. *Service with oval, wedge-shaped, sawed, angular leaves, hoary on their under-side, and prickly branches.* Mespilus Virginiana, grofsulariæ foliis.—Pluk. Phyt. 100. f. *THE GOOSEBERRY-LEAVED VIRGINIAN THORN.*

This sort grows naturally in North America; it has a slender shrubby stalk, rising about six or seven feet high, sending out many irregular branches, armed with long slender thorns, and garnished with short, oval, wedge-shaped leaves, which are sawed on their edges, and are woolly on their under side; the flowers are small, proceeding from the side of the branches, standing sometimes single, and at other times two or three upon the same foot-stalk, having large leafy empalements, and are succeeded by small roundish fruit, with a large leafy umbilicus, which before was the empalement of the flower: The flowers appear the beginning of June, and the fruit ripens very late in the autumn. There is a variety of this species called the Carolina Hawthorn, which has longer and whiter leaves, large flowers and fruit, but without thorns.

8. CRATÆGUS *(VIRIDIS)* foliis lanceolato-ovatis subtrilobis serratis glabris, caule inermi. Lin. Sp. Pl. 683. *THE GREEN-LEAVED VIRGINIAN THORN.*

The stem and branches of this sort are altogether destitute of thorns. The leaves are lanceolate, oval, nearly trilobate, serrated, smooth, and green on both sides. The flowers are white and mod rately large; they come out about the end of May, and are succeeded by a roundish fruit which ripens late in autumn. It is a native of Virginia.

2. The timber of the Sorb is useful for the joiner, and with which I have seen a room curiously wainscotted: Also for the engraver of wood cuts; for bows, pulleys, screws, mill and other spindles; for goads to drive oxen with; for pistol and gun-stocks, and for most that the wild Pear-tree serves: being of a very delicate grain, it serves the turner for divers curiosities, and looks beautifully, and is almost everlasting; when rubbed over with oil of linseed, well boiled, it is made to counterfeit Ebony, or almost any Indian wood, coloured according to art: Also

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All these species are propagated by sowing the seeds; and the varieties are continued by budding them upon stocks of the whitethorn.——In order to raise them from seeds, it is, by some, advised to sow them soon after they are ripe, in beds of fresh, light, rich earth. Let alleys be left between the beds, for the conveniency of weeding, and let the seeds be covered over with fine mould, about an inch deep. The summer following, the beds must be kept clean of weeds, and probably some few plants will appear: But this is not common in any of the sorts; for they generally lie till the second spring after sowing before they come up. At the time they make their appearance they must be watered, if the weather proves dry; and this should be occasionally repeated all summer. They should also be constantly kept clean from weeds; and in the autumn the strongest may be drawn out, and set in the nursery-ground, a foot asunder, in rows two feet distant from each other: while the weakest may remain until another year. During the time they are in the nursery, the ground between the rows should be dug every winter, and the weeds constantly hoed down in the summer; and this is all the trouble they will require until they are planted out for good, which may be in two, three, or more years, at the pleasure of the owner, or according to the purposes for which they are wanted.—I rather recommend them to be raised as the Common Haw in the following manner: The Common Haw, used for our fences in England, should, as soon as gathered, be buried in a dry trench in the month of October. To prevent their being heated, it will be proper to pick off any leaves that may have been gathered with them; and for the same reason they should not lie above a foot thick in the trench. In this bed they should remain two winters and one summer. In the second spring they will begin to sprout, when they should be sown in beds, and kept clear from weeds. Some of those plants will be of size to plant out for hedges the first year, and, in the North of England, will sell for three shillings per thousand; but it is much more judicious to draw them from the seed-bed and transplant them into the nursery at six inches distance from each other. There they should remain two years, at the expiration of which time they will have got good roots. Such plants are cheaper at seven shillings a thousand than those from the seed-bed at half a crown. To this observation I earnestly request the attention of all persons engaged in making inclosures.

In the Linnæan System the CRATÆGUS, or WILD SERVICE, is of the clafs and order *Icosandria Digynia*, the flower having twenty or more stamina and two styles.

BOOK I.

it is taken to build with, yielding beams of considerable substance. The shade is beautiful for walks, and the fruit not unpleasant, especially the second kind; of which, with new wine and honey, they make a conditum of admirable effect to corroborate the stomach; and the fruit alone is good in dysenteries and lasks. The water distilled from the stalks of the flowers and leaves in B. M. and twice rectified upon fresh matter, is incomparable for consumptive and tabid bodies, taking an ounce daily at several times: Likewise it cures the green-sickneſs in virgins, and is prevalent in all fluxes; distilled warm into the ears, it abates the pain; the wood or bark contused, and applied to any green wound, heals it; and the powder thereof, drank in olive-oil, consolidates inward ruptures: Lastly, the salt of the wood, taken in decoction of althæa to three grains, is an incomparable remedy to break and expel gravel[n]. The Service gives the Husbandman an early presage of the approaching spring, by extending its adorned buds for a peculiar entertainment, and dares peep out in the severest winters.

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[n] The fixed alkaline salt, produced from burnt vegetables, is similar in its nature and effects, whether made from the ashes of the Service-tree, the Oak, the Ash, or any other vegetable body. Such salts are generally supposed, by physicians, to be diſsolvers of the stone, and capable of preventing the attraction of the stony particles towards each other, whereby the formation of gravel in the kidneys is prevented.

The wild Black Cherry Tree

Published 1st June 1771 by A. Hunter & W. Davis the Act directs.

J. Miller del. & sc.

CHAP. XI.

The BLACK CHERRY°.

CHAP. XI.

I RANK this amongst the forest berry-bearing trees (frequent in the hedges, and growing wild in Herefordshire, and many places; for I speak not here of our orchard Cherries, said to have been brought into Kent out of Flanders by Henry VIII.) chiefly from the suffrage of that industrious planter, Mr. Cooke, from whose ingenuity and experience (as well as out of gratitude for his frequent mentioning of me in his elaborate and useful work) I acknowledge to have benefited myself; though I have also given no obscure taste of this pretty tree in book ii. chap vii.

It is raised of the stones of Black Cherries very ripe, (as they are in July,) endeavouring to procure such as are full and large; whereof some he tells us, are a little inferior to the Black Orleance, without graffing, and from the very genius of the ground. These gathered, the fleshy part is to be taken off by rolling them under a plank in dry sand; and when the humidity is off (as it will be in three or four days) reserve them in sand again, a little moist and housed, till the beginning of February, when you may sow them in a light gravelly mould, keeping them clean for two years, and thence planting them into your nurseries to raise other kinds upon, or for woods, copses, and hedge-rows, and for walks and avenues. In a dryish soil, mixt with loam, though the

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°The WILD CHERRY-TREE is titled PRUNUS *(CERASUS)* umbellis subsefsilibus, foliis ovato-lanceolatis conduplicatis glabris. Sp. Pl. 679. J. Bauhine calls it Cerasus Sylvestris, fructu nigro et rubro. It belongs to the clafs and order *Icosandria Monogynia*, having twenty or more stamina, and only one style.

This tree is very proper to plant in parks, because it grows to a large size, and makes a beautiful appearance. In the spring, when in full flower, it is highly ornamental.—It thrives in poor land much better than most other sorts. The French often plant it for avenues to their houses. They also cultivate it in their woods for hoops, for which purpose they esteem it much. The ſtones of the Wild Cherry are generally sown for raising stocks to graft, or bud the other sorts of Cherries upon, being of a quick growth, and considerable duration. In Scotland this tree is called the GEEN TREE. The fruit is very pleasant. Many fine trees of this sort grow at Whixley, near Wetherby.

BOOK I. bottom be gravel, they will thrive into stately trees, beautified with blosoms of a surprising whiteneſs, greatly relieving the sedulous bees, and attracting birds.

If you sow them in beds immediately after they are excarnated, they will appear the following spring, and then, at two years shoot, be fit to plant out where you please; otherwise, being kept too long ere you sow them, they will sleep two winters: And this is a rule which he prescribes for all sorts of stone-fruit.

You may almost at any time remove young Cherry-trees, abating the heads to a single shoot.

He recommends it for the copse, as producing a strong shoot, and as apt to put forth from the roots as the Elm, especially if you fell lusty trees: In light ground it will increase to a goodly tall tree, of which he mentions one that held above eighty-five feet in height. I have myself planted of them, and imparted to my friends, which have thrived exceedingly; but till now did not insert it among the foresters: The virtues of the fruit of this Cherry-tree against the epilepsy, palsy, and convulsions, are in the spirits and distilled waters. Concerning its other uses, see the chapter above-mentioned. This tree affords excellent stocks for the budding and graffing of other Cherries on.

And here I might mention the Bitter Cherry of Canada, (though exceedingly unlike to ours,) which should yet be propagated for the incomparable liquor it is said to yield, preferable to the best lemonade, by an incision of two inches deep in the stem, and sloping to the length of a foot, without prejudice to the tree [p]. What is said of it, and of the Maple, in the late discovery of North America, may be seen in the late description of those countries. For other exotic species, vide Raii Dendrolog. tom. ii. p. 45, 46.

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[p] The CANADA CHERRY-TREE is titled, PRUNUS *(CANADENSIS)* floribus racemosis, foliis lato-lanceolatis rugosis utrinque pubescentibus. Lin. Sp. Pl. 678. Cerasus pumila Canadensis, oblongo angusto folio, fructu parvo. Duham. Arb. 1. p. 149.

This is a low shrub seldom rising higher than four feet. It puts out lateral branches, which, lying near the ground, readily take root, by which it multiplies fast. The fruit resembles our small wild Cherry, but has a bitter taste, and is only agreeable to birds. It flowers at the same time with the other Cherry-trees, and ripens its fruit in July. It is easily propagated by layers, or it may be raised from the stones.

The common Maple Tree.

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J. E. Miller del.t &c.

CHAP. XII.

The MAPLE[q].

ACER MINUS, the MAPLE, (of which authors reckon many kinds,) was of old held almost in equal estimation with the Citron, especially the Pavonaceous, or Peacock's-tail Maple; which is that sort so elegantly undulated, and crisped into variety of curls. It were a most laudable CHAP. XII.

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[q] Of the MAPLE there are various species:

ACER *(PSEUDO-PLATANUS)* foliis quinquelobis inæqualiter serratis, floribus racemosis. Lin. Sp. Pl. 1495 *THE GREATER MAPLE*, or *SYCAMORE TREE.*

This is a large growing tree, and adapted to increase the variety in our woods and fields.—It is very proper, if kept down, for underwood, because it shoots very fast from the stool and makes excellent fuel. There is no tree more proper than this to form large plantations near the sea; for the spray, which is prejudicial to most trees, seems to have no bad effect upon it. The Sycamore is not only a large timber-tree, but will stand long on the soil before it decays. This may be seen from what St. Hierom says, who lived in the fourth century after Christ, namely, That he saw the Sycamore tree which Zaccheus climbed up to see our Saviour ride in triumph to Jerusalem. The propagation of the Sycamore is very easy. In the autumn, when the keys are ripe, they may be gathered, and, in a few days after, sown, as has been directed for the Ash. In the spring the plants will appear, and make a shoot of about a foot by the autumn following, if the ground of the seminary be tolerably good, and they are kept clean from weeds. The spring after they come up, they should be planted in the nursery, in rows two feet and a half asunder, and their distance in the rows must be one foot and a half. Here they may remain till they are big enough to plant out for good, with no farther trouble than taking off unsightly side-branches, and such as have a tendency to make the tree forked, except digging between the rows, which must be done every winter.

2. ACER *(CAMPESTRE)* foliis lobatis obtusis emarginatis Lin. Sp. Pl. 1497. Acer Campestre et minus. C. B. P. 431. *THE COMMON MAPLE.*

This does not grow to such a large size as the Sycamore, though its timber is of greater value. We meet with high encomiums on this wood among the antients: Pliny gives us many; and Virgil introduces Evander sitting on a Maple throne. The first-mentioned author highly commends the Maples growing in different parts of the world, and extols many of them for the remarkable fineness of their grain: Indeed the fineness of the grain ever governs the value of the wood. In former times, so mad were people in searching for the Bruscum of this tree, which often formed the exact representation of birds, beasts, &c. that they spared no expence in procuring it. When boards, big enough for tables, were found of this

BOOK I. attempt, if some would inquire out, and try the planting of such sorts as are not indigenous amongst us; as is especially the German Aier, and that of Virginia, not yet cultivated here, but an excellent tree: And if this were extended likewise to other timber and exotic trees, it would prove of extraordinary benefit and ornament to the public, and were worthy even of the Royal Care. They are all produced of seeds contained

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curious part of the wood, the extravagance of purchasers was incredible. We read of a table made of the Bruscum, which cost ten hundred thousand festerces, and of another that cost upwards of fifteen hundred thousand. The Maple is seldom planted in such quantities together as to form woods; but where they appear in plantations, they are generally cut down for underwood; for which purpose they answer extremely well, as they shoot away from their stools very fast, and make tolerable fuel. The largest trees are generally found in hedge-rows, where they are occasionally to be met with all over the kingdom. The timber is used for several curious purposes, such as musical instruments, inlayings, &c.—For turnery ware it is superior to most other woods. The flower-buds of the Maple begin to open about the sixth of April, and the leaves are out about the eighteenth. The flowers are in full blow about the eleventh of May, and the seeds are ripe in the autumn. If a quantity of these trees are wanted, they may be raised in the same manner as the Sycamore, and managed accordingly.

3. ACER *(NEGUNDO)* foliis compositis, floribus racemosis. Lin. Sp. Pl. 1497. Acer maximum, foliis trifidis et quinquefidis, Virginianum. Pluk. Alm. *VIRGINIA ASH-LEAVED MAPLE.*

This is a quick grower, and becomes a large timber-tree. It is admirably adapted to cause a beautiful variety in our woods, though it is not proper to be planted in exposed places, the branches being subject to split when attacked by violent winds. The leaves are of a pale green colour, moderately large, and fall off pretty early in the autumn. The timber is extremely useful for turners; and like the Norway Maple, serves all the purposes of the Sycamore. It is propagated by the keys, which this tree, though a native of Virginia, perfects in our country. It is also propagated by layers, or by planting the cuttings, in a moist situation, in the autumn.

4. ACER *(PLATANOIDES)* foliis quinquelobis acuminatis acutè dentatis glabris, floribus corymbosis. Lin. Sp. Pl. 1496. *THE NORWAY MAPLE WITH PLANE-TREE LEAVES.*

This Maple will grow to a large timber-tree, and therefore should be raised to encrease the variety in our plantations. The leaves are of a shining green colour, look beautiful all summer, and die to a golden yellow in the autumn. This tree perfects its seeds with us; so that it may be raised in the same manner as the Sycamore, from the keys. It may also be propagated by layers and by cuttings; which, if planted in a moist soil in autumn, will grow. These should be ordered in the nursery-way, as was before directed, and managed till they are of a sufficient size to be planted out for good. These trees being scarce, have been hitherto seldom planted, unless in wilderness-quarters for ornament.—But as it is a very quick grower, arrives at a great bulk, and answers all the purposes of the Sycamore, the raising it, even for this use, as well as for ornament and variety, should

in the folliacles and keys, or birds-tongues (as they are called) like the Ash (after a year's interment) and, like to it, affect a sound and a dry mould, growing both in woods and hedge-rows, especially in the latter; which, if rather hilly than low, affords the fairest timber. It is also propagated by layers and suckers. By shredding up the boughs to a head, I have caused it to shoot to a wonderful height in a little time,

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not be neglected.—The Norway Maple is reckoned among our beſt trees for sheltering habitations.

5. ACER *(RUBRUM)* foliis quinquelobis subdentatis subtus glaucis, pedunculis simplicisſimis aggregatis. Lin. Sp. Plant. 1496. Acer Virginianum folio majore, subtus argenteo supra viridi splendente. Pluk. Alm. *THE SCARLET-FLOWERING MAPLE.*

Of this species of Maple there is a variety called Sir Charles Wager's Maple. Both of these are propagated for the sake of the flowers, which are of a scarlet colour, and come out early in the spring. The leaves are composed of five sharp-pointed lobes, which are slightly indented or serrated; they are smooth, of a pale green on their upper surface and white underneath: They grow on long, simple, taper, reddish foot-stalks. The flowers come out in clusters from the side of the branches. They appear in April, and the seeds ripen in June. The sort called Sir Charles Wager's, produces larger clusters of flowers than the other; on which account it is in most esteem. The red Maple grows plentifully in Pennsylvania, and delights in swampy situations, in which the Alder is commonly its companion. Of this wood the natives make plates, spinning wheels, beds, and almost all sorts of wood-work. With the bark they dye worsted and linen of a dark blue colour. For which purpose it is first boiled in water, and some copperas, such as the hat-makers commonly make use of, is added, before the stuff is put into the boiler. The bark also makes a good black ink. There is a variety of this tree which they call the CURLED MAPLE, the wood being marbled within; it is much used for all kinds of joiner's work, and the utensils made of it are esteemed better than those of any other wood. This kind is not very frequent, and it is observed by the natives, that the outsides of curled Maples are often marbled, while their insides are not; the tree is therefore cut very deep before it is felled, to see whether it has veins in every part.

6. ACER *(SACCHARINUM)* foliis quinquepartito-palmatis acuminato-dentatis. Lin. Sp. Plant. 1496. *THE SUGAR-MAPLE.*

This has some resemblance to the Norway Maple when the plants are young; but as they grow up the leaves are more deeply divided, and their surfaces leſs smooth, so that they are then easily distinguished. From this tree the inhabitants of North America make a very good sort of sugar, by tapping the trees early in the spring, and boiling the juice, which, by the usual proceſs, is converted into sugar. Dr. Benjamin Rush, Profeſſor of the Institutes of Medicine in the University of Pennsylvania, has given us a most circumstantial and correct account of the manner of obtaining sugar from this species of Maple. He says, "The *Acer Saccharinum* of Linnæus, or the Sugar Maple-tree, grows in great quantities in the western counties of all the middle states of the American Union. Those which grow in New-York and Pennsylvania yield the Sugar in a greater quantity than those which grow on

BOOK I. but if you will lop it for the fire, let it be done in January; and indeed it is observed to be of noxious influence to the subnascent plants of other kinds, by reason of a clammy dew, which it sheds upon them; and therefore they should not be indulged in Pollards or spreading trees, but to thicken underwoods and copses. The timber is far superior to Beech

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the waters of the Ohio. These trees are generally found mixed with the Beech, *Fagus Ferruginea;* Hemlock, *Pinus abies;* White and Water Ash, *Fraxinus Americana;* the Cucumber tree, *Magnolia acuminata;* Linden, *Tilia Americana;* Aspen, *Populus tremula;* Butter Nut, *Juglans alba (oblonga);* and Wild Cherry tree, *Prunus Virginiana* of Linnæus. They sometimes appear in groves covering five or six acres in a body, but they are more commonly interspersed with some or all of the forest-trees which have been mentioned. From thirty to fifty trees are generally found upon an acre of ground. They grow only in the richest soils, and frequently in stony ground. Springs of the purest water abound in their neighbourhood. They are, when fully grown, as tall as the white and black Oaks, and from two to three feet in diameter *. They put forth a beautiful white bloſsom in the spring before they show a single leaf. The colour of the bloſsom distinguishes them from the Acer Rubrum, or the common Maple, which affords a bloſsom of a red colour. The wood of the Sugar Maple-tree is extremely inflammable, and is preferred upon that account by hunters and surveyors for fire-wood. Its small branches are so much impregnated with sugar, as to afford support to the cattle, horses, and sheep of the first settlers during the winter, before they are able to cultivate forage for that purpose. Its ashes afford a great quantity of pot-ash, exceeded by few, or perhaps by none, of the trees that grow in the woods of the United States. The tree is supposed to arrive at its full growth in the woods in twenty years. It is not injured by tapping; on the contrary, the oftener it is tapped, the more syrup is obtained from it. In this respect it follows a law of animal secretion. A single tree had not only survived, but flourished after *forty-two* tappings in the same number of years. The effects of a yearly discharge of sap from the tree, in improving and increasing the sap, is demonstrated from the superior excellence of those trees which have been perforated in an hundred places, by a small wood-pecker which feeds upon the sap. The trees, after having been wounded in this way, distil the remains of their juice on the ground, and afterwards acquire a black colour. The sap of these trees is much sweeter to the taste than that which is obtained from trees which have not been previously wounded, and it affords more sugar. From twenty-three gallons and one quart of sap, procured in twenty hours from only two of these dark coloured trees, Arthur Noble, Esq. of the State of New York, obtained four pounds and thirteen ounces of good grained sugar. A tree of an ordinary size yields in a good season from twenty to thirty gallons of sap, from which are made from five to six pounds of sugar. To this there are sometimes remarkable exceptions. Samuel Lowe, Esq. a justice of peace in Montgomery county, in the State of New York, informed Arthur Noble, Esq. that he had made twenty pounds and one ounce of sugar between the 14th and 23d of April, in the year

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* Baron La Hontan, in his voyage to North America, gives the following account of the Maple-tree in Canada. After describing the black Cherry-tree, some of which he says are as tall as the loftiest oaks, and as big as a hogshead, he adds, " the Maple-tree is much of the same height and bulk. It bears no resemblance to that sort we have in Europe."

for all uses of the turner, who seeks it for dishes, cups, trays, trenchers, &c. as the joiner for tables, inlayings, and for the delicateneſs of the grain, when the knurs and nodosities are rarely diapered, which does much advance its price: Our turners will work it so thin, that it is almost transparent. It is commended for its lightneſs, under the name

1789, from a single tree that had been tapped for several succeſsive years before. From the influence which culture has upon forest and other trees, it has been supposed, that by transplanting the Sugar Maple-tree into a garden, or by destroying such other trees as shelter it from the rays of the sun, the quantity of the sap might be increased, and its quality much improved. I have heard of one fact which favours this opinion. A farmer in Northampton county, in the State of Pennsylvania, planted a number of these trees above twenty years ago in his meadow, from *three* gallons of the sap of which he obtains every year a pound of sugar. It was observed formerly, that it required *five* or *six* gallons of the sap of the trees which grow in the woods to produce the same quantity of sugar. The sap distils from the *wood* of the tree. Trees which have been cut down in the winter for the support of the domestic animals of the new settlers, yield a considerable quantity of sap as soon as their trunks and limbs feel the rays of the sun in the spring of the year. It is in consequence of the sap of these trees being equally diffused through every part of them, that they live three years after they are *girdled;* that is, after a circular incision is made through the bark into the substance of the tree for the purpose of destroying it. It is remarkable that graſs thrives better under this tree in a meadow, than in situations exposed to the constant action of the sun. The season for tapping the trees is in February, March, and April, according to the weather which occurs in these months. *Warm* days and *frosty* nights are most favourable to a plentiful discharge of the sap *. The quantity obtained in a day from a tree, is from five gallons to a pint, according to the greater or leſs heat of the air. Mr. Lowe informed Arthur Noble, Esq. that he obtained near three and twenty gallons of sap in one day, (April 14, 1789) from the single tree which was before mentioned. Such instances of a profusion of sap in single trees are however not very common. There is always a suspension of the discharge of sap in the night, if a frost succeed a warm day. The perforation in the tree is made with an ax or an auger. The latter is preferred, from experience of its advantages. The auger is introduced about three-quarters of an inch, and in an ascending direction, (that the sap may not be frozen in a slow current in the mornings or evenings,) and is afterwards deepened gradually to the extent of two inches. A spout is introduced about half an inch into the hole made by this auger, and projects from three to twelve inches from the tree. The spout is generally made of the Sumach, *Rhus*, or Elder, *Sambucus Canadensis*, which generally grows in the neighbourhood of the sugar-trees. The tree is first tapped on the *south*-side; when the discharge of its sap begins to leſsen, an opening is made

* The influence of the weather in increasing and leſsening the discharge of the sap from trees is very remarkable.

Dr. Tonge supposed long ago, (Philosophical Transactions, No. 68.) that changes in the weather of every kind might be better ascertained by the discharge of sap from trees than by weather glaſses. I have seen a journal of the effects of heat, cold, moisture, drought and thunder upon the discharges from the sugar trees; which disposes me to believe that there is some foundation for Dr. Tonge's opinion.

BOOK I. Aier, and employed often by those who make musical instruments; that especially which grows in Friuli, Carniola, and Saltzburglandt. There is a larger sort which we call the Sycamore.

2. Pliny's description of this leſser Maple, and the antient value of it, is worth the citing. *Acer operum elegantiâ et subtilitate Citro secundum.*

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on the *north*-side, from which an increased discharge takes place. The sap flows from four to six weeks, according to the temperature of the weather. Troughs large enough to contain three or four gallons, made of white Pine or white Ash, or of dried water Ash, Aspen, Linden, Poplar, *Liriodendron Tulipifera*, or common Maple, are placed under the spout, to receive the sap, which is carried every day to a large receiver, made of any of the trees before mentioned. From this receiver it is conveyed, after being strained, to the boiler. To preserve the sap from rain and impurities of all kinds, it is a good practice to cover the troughs with a concave board, with a hole in the middle of it. It remains yet to be determined whether some artificial heat may be applied so as to increase the quantity and improve the quality of the sap. Mr. Noble informed me, that he saw a tree, under which a farmer had accidentally burnt some brush, which dropped a thick heavy syrup resembling melaſses. This fact may probably lead to something useful hereafter. During the remaining part of the spring months, as also in the summer, and in the beginning of autumn, the Maple-tree yields a thin sap, but not fit for the manufactory of sugar. It affords a pleasant drink in harvest, and has been used instead of rum, in some instances, by those farmers in Connecticut, whose ancestors have left to them here and there a Sugar Maple-tree, (probably to shade their cattle) in all their fields. Mr. Bruce describes a drink of the same kind, prepared by the inhabitants of Egypt, by infusing the sugar-cane in water, which he declares to be "the most refreshing drink in the world *." There are three methods of reducing the sap to sugar.

"1. By *freezing it.* This method has been tried for many years, by Mr. Obadiah Scott, a farmer in Luzerne county in this State, with great succeſs. He says that one half of a given quantity of sap reduced in this way, is better than one third of the same quantity reduced by boiling. If the frost should not be intense enough, to reduce the sap to the graining point, it may afterwards be exposed to the action of the fire for that purpose.

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* Baron La Hontan gives the following account of the sap of the sugar Maple-tree, when used as a drink, and of the manner of obtaining it. "The tree yields a sap which has a much pleasanter taste than the best lemonade or cherry water, and makes the wholesomest drink in the world. This liquor is drawn by cutting the tree two inches deep in the wood, the cut being made sloping to the length of ten or twelve inches, at the lower end of this gash a knife is thrust into the tree slopingly, so that the water runs along the cut or gash, as through a gutter, and falls upon the knife, which has some vefsel placed underneath to receive it. Some trees will yield five or six bottles of this water in a day; and some inhabitants of Canada might draw twenty hogsheads of it in one day, if they would thus cut and notch all the Maple-trees of their respective plantations. The gash does no harm to the tree. Of this sap they make sugar and syrup which is so valuable, that there can be no better remedy for fortifying the stomach; it is but few of the inhabitants that have the patience to make them, for as common things are slighted, so there are scarce any body but children that give themselves the trouble of gashing these trees."

Plura ejus genera. Album quod præcipui candoris, vocatur Gallicum in Transpadana Italia, transque Alpes nascens. Alterum genus crispo maculârum discursu: qui cum excellentior fuit, a similitudine caudæ pavonum nomen accepit. " The Maple, for the elegancy and fineneſs of the wood, " is next to the very Citron itself. There are several kinds of it, especially " the White, which is wonderfully beautiful; this is called the French

CHAP. XII.

" 2. By *spontaneous evaporation*. The hollow stump of a Maple sugar-tree, which had been cut down in the spring, and which was found some time afterwards filled with sugar, first suggested this method of obtaining sugar to our farmers. So many circumstances of cold and dry weather, large and flat veſsels, and above all so much time is neceſsary to obtain sugar, by either of the above methods, that the most general method among our farmers is to obtain it,

" 3. By *boiling*. For this purpose the following facts, which have been ascertained by many experiments, deserve attention. *First*, The sooner the sap is boiled, after it is collected from the tree, the better. It should never be kept longer than twenty-four hours before it is put over the fire. *Secondly*, The larger the veſsel in which the sap is boiled, the more sugar is obtained from it. *Thirdly*, A copper veſsel affords a sugar of a fairer colour than an iron veſsel.

" The sap flows into wooden troughs from which it is carried and poured into store troughs or large cisterns, in the shape of a canoe or large manger, made of white Ash, Linden, or white Pine, from which it is conveyed to the kettle in which it is to be boiled. These cisterns, as well as the kettle, are generally covered by a shed to defend the sap from the rain. The sugar is improved by straining the sap through a blanket or cloth, either before or after it is half boiled. Butter, hog's lard, or tallow, are added to the sap in the kettle to prevent its boiling over, and lime, eggs, or new milk, are mixed with it in order to clarify it. I have seen clear sugar made without the addition of either of them. A spoonful of slacked lime, the white of one egg, and a pint of new milk, are the usual proportions of these articles, which are mixed with fifteen gallons of sap. In some samples which I have lately seen of Maple-sugar clarified with each of the above articles, that in which milk alone was used, had an evident superiority over the others, in point of colour. The sugar, after being sufficiently boiled, is *grained* and *clayed*, and afterwards *refined*, or converted into loaf-sugar. The methods of conducting each of these proceſses is so nearly the same with those which are used in the manufactory of West-India sugar, and are so generally known, that I need not spend any time in describing them. It has been a subject of inquiry, whether the Maple-sugar might not be improved in its quality, and increased in its quantity, by the establishment of boiling-houses in the sugar Maple country, to be conducted by *aſsociated* labour. From the scattered situation of the trees, the difficulty of carrying the sap to a great distance, and from the many expences which must accrue from supporting labourers and horses in the woods, in a season of the year in which nature affords no sustenance to man or beast, I am disposed to believe that the most productive method both in quantity and profit of obtaining this sugar, will be by the labour of private families. For a great number of years, many hundred private families in New-York and Pennsylvania, have supplied themselves plentifully with this sugar during the whole year. I have heard of many families who have made from two to four hundred pounds in a year; and of one man who sold six hundred pounds, all made with his own hands in one

BOOK I. "Maple, and grows in that part of Italy that is on the other side of the "Po beyond the Alps; the other has a curled grain, so curiously macu- "lated, that, from a near resemblance, it was usually called the Peacock's "Tail." Lib. xvi. c. xvi. He goes on to commend that of Istria, and that growing on the mountains, for the best: In the next chapter, he says, *Pulcherrimum vero est Bruscum, multoque excellentius etiamnum Molluscum.*

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season *. Not more knowledge is neceſsary for making this sugar than is required to make soap, cyder, beer, sour-crout, &c. and yet one or all of these are made in most of the farm-houses of the United States. The kettles and other utensils of a farmer's kitchen, will serve most of the purposes of making sugar, and the time required for the labour, (if it deserves that name) is at a season when it is impoſsible for the farmer to employ himself in any species of agriculture. His wife and all his children above ten years of age, moreover, may aſsist him in this buſineſs, for the profit of the weakest of them is nearly equal to that of a man, when hired for that purpose. A comparative view of this sugar has been frequently made with the sugar which is obtained from the Weſt-India sugar-cane, with respect to its quality, price, and the poſsible or probable quantity that can be made of it in the United States, each of which I shall consider in order.

"1. The quality of this sugar is neceſsarily better than that which is made in the West Indies. It is prepared in a season when not a single insect exists to feed upon it, or to mix its excretions with it, and before a particle of dust, or of the pollen of plants, can float in the air. The same observation cannot be applied to the West-India sugar. The insects and worms which prey upon it, and of course mix with it, compose a page in a nomenclature of natural history. I shall say nothing of the hands which are employed in making sugar in the West Indies, but, that men who work for the exclusive benefit of others, are not under the same obligations to keep their persons so clean, while they are employed in this work, as men, women, and children are, who work excluslvely for the benefit of themselves, and who have been educated in the habits of cleanlineſs. The superior purity of the Maple-sugar is farther proved by its leaving a leſs sediment when diſsolved in water, than the West-India sugar. It has been supposed, that the Maple-sugar is inferior to the West India sugar in strength. The experiments which led to this opinion, I suspect, have been inaccurate, or have been made with Maple-sugar prepared in a slovenly manner. I have examined equal quantities, by weight, of both the grained and the loaf-sugar, in hyson-tea, and in coffee, made in every respect equal by the minutest circumstances that could affect the quality or taste of each of them, and could perceive no inferiority in the strength of the Maple-sugar. The liquors

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* The following receipt, published by William Cooper, Esq. in the Albany Gazette, fully established this fact.

"Received, Cooper's Town, April 30, 1790, of William Cooper, sixteen pounds, for six hundred and forty "pounds of sugar made with my own hands, without any aſsi ance, in leſs than four weeks, besides attending "to the other buſineſs of my farm, as providing fire-wood, taking care of the cattle, &c.

"Witneſs R. SMITH. JOHN NICHOLLS."

A single family, consisting of a man and his two sons, on the Maple sugar-lands, between the Delaware and Susquehannah, made 1800lb. of Maple sugar in one season.

Tuber utrumque arboris ejus: Bruscum intortius crispum: Molluscum simplicius sparsum. Et si magnitudinem mensarum caperet, haud dubie præferretur Citro. Nunc intra pugillares, lectorumque silicios, aut laminas, raro usu spectatur. E Brusco fiunt et mensæ nigrescentes. "the Brus-
"cum, or Knur, is wonderfully fair, but the Molluscum is counted most
"precious; both of them knobs and swellings out of the tree. The

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which decided this question were examined at the same time, by Alexander Hamilton, Esq. Secretary of the Treasury of the United States, Mr. Henry Drinker, and several ladies, who all concurred in the above opinion.

"2. Whoever considers that the gift of the Sugar Maple-trees is from a benevolent Providence, that we may have many millions of acres in our country covered with them, that the tree is improved by repeated tappings, and that the sugar is obtained by the frugal labour of a farmer's family: and at the same time considers the labour of cultivating the sugar cane, the capitals sunk in sugar works, the first cost of slaves and cattle, the expences of provisions for both of them, and in some instances the additional expence of conveying the sugar to a market, in all the West India Islands, will not hesitate in believing that the Maple-sugar may be manufactured much cheaper, and sold at a lefs price than that which is made in the West Indies.

"3. The resources for making a sufficient quantity of this sugar not only for the consumption of the United States, but for exportation, will appear from the following facts. There are in the States of New York and Pennsylvania alone, at least ten millions of acres of land which produce the sugar Maple-tree, in the proportion of thirty trees to one acre. Now supposing all the persons capable of labour in a family to consist of three, and each person to attend 150 trees, and each tree to yield 5lb. of sugar in a season, the product of the labour of 60,000 families would be 135,000,000 pounds of sugar, and allowing the inhabitants of the United States to compose 600,000 families, each of which consumed 200 pounds of sugar in a year, the whole consumption would be 120,000,000 pounds in a year, which would leave a balance of 15,000,000 pounds for exportation. Valuing the sugar at 6-90ths of a dollar per pound, the sum saved to the United States would be 8,000,000 dollars by home consumption, and the sum gained by exportation would be 1,000,000 dollars.—The only part of this calculation that will appear improbable, is, the number of families supposed to be employed in the manufactory of the sugar, but the difficulty of admitting this supposition will vanish when we consider, that double that number of families are employed every year in making cyder; the trouble, risks, and expences of which are all much greater than those of making maple-sugar. But the profit of the Maple-tree is not confined to its sugar. It affords a most agreeable melafses, and an excellent vinegar. The sap which is suitable for these purposes, is obtained after the sap which affords the sugar has ceased to flow, so that the manufactories of these different products of the Maple-tree, by succeeding, do not interfere with each other. The melafses may be made to compose the basis of a pleasant summer beer. The sap of the Maple is moreover capable of affording a spirit; but we hope this precious juice will never be prostituted by our citizens to this ignoble purpose. Should the use of sugar in diet become more general in our country, it may tend to lefsen the inclination or supposed necefsity for spirits; for I have observed a relish for sugar in diet to be seldom accompanied by a love for strong drink. It is the sugar which is mixed with tea which makes it so generally disagreeable to drunkards. But

BOOK I. " The Bruscum is more intricately crisped, the Molluscum not so much; " and had we trees large enough to saw into planks for tables, it " would be preferred before Citron; but now they use it only for small " table-books, and, with its thin boards, to wainscot bed-testers with. " The Bruscum is of a blackish kind, with which they make tables."— Thus far Pliny. And such spotted tables were the famous Tigrin and

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a diet consisting of a plentiful mixture of sugar, has other advantages to recommend it, which I shall briefly enumerate.

" Sugar affords the greatest quantity of nourishment, in a given quantity of matter, of any substance in nature; of course it may be preserved in less room in our houses, and may be consumed in less time, than more bulky and less nourishing aliment. It has this peculiar advantage over most kinds of aliment, that it is not liable to have its nutritious qualities affected by time or the weather: hence it is preferred by the Indians in their excursions from home. They mix a certain quantity of Maple-sugar, with an equal quantity of Indian corn, dried and powdered, in its milky state. This mixture is packed in little baskets, which are frequently wetted in travelling, without injuring the sugar. A few spoonfulls of it, mixed with half a pint of spring water, afford them a pleasant and strengthening meal. From the degrees of strength and nourishment, which are conveyed into animal bodies by a small bulk of sugar, I conceive it might be given to horses with great advantage, when they are used in places, or under circumstances, which make it difficult or expensive to support them, with more bulky or weighty aliment. A pound of sugar, with grass or hay, I have been told, has supported the strength and spirits of an horse, during a whole day's labour in one of the West India Islands. A larger quantity given alone, has fattened horses and cattle, during the war before last, in Hispaniola, for a period of several months, in which the exportation of sugar, and the importation of grain, were prevented by the want of ships.

" 2. The plentiful use of sugar in diet, is one of the best preventatives that has ever been discovered, of the diseases which are produced by worms. The Author of Nature seems to have implanted a love for this aliment in all children, as if it were on purpose to defend them from those diseases. I know a gentleman in Philadelphia, who early adopted this opinion, and who by indulging a large family of children in the use of sugar, has preserved them all from the diseases usually occasioned by worms.

" 3. Sir John Pringle has remarked, that the plague has never been known in any country where sugar composes a material part of the diet of the inhabitants. I think it probable, that the frequency of malignant fevers of all kinds has been lessened by this diet, and that its more general use would defend that class of people, who are most subject to malignant fevers, from being so often affected by them.

" 4. In the numerous and frequent disorders of the breast, which occur in all countries, where the body is exposed to a variable temperature of weather, sugar affords the basis of many agreeable remedies. It is useful in weaknesses, and acrid defluxions, upon other parts of the body. Many facts might be adduced in favour of this assertion. I shall mention only one, which from the venerable name of the person, whose case furnished it, cannot fail of commanding attention and credit. Upon my inquiring of Dr. Franklin, at the request of a friend, about a year before he died, whether he had found any relief from the pain of the stone, from the Blackberry Jam, of which he took large quantities, he told me that he had,

Pantherine curiosities; not so called from being supported with figures carved like those beasts, as some conceive, and was in use even in our grandfathers' days, but from the natural spots and maculations; *Hem, quantis facultatibus æstimavere ligneas maculas!* as Tertullian cries out, de Pallio, cap. v. Such a table was that of Cicero, which cost him ten thousand sesterces; such another had Asinius Gallus. That of King

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but that he believed the medicinal part of the jam resided wholly in the sugar; and as a reason for thinking so, he added, that he often found the same relief, by taking about half a pint of a syrup prepared by boiling a little brown sugar in water, just before he went to bed, that he did from a dose of opium. It has been supposed by some of the early physicians of our country, that the sugar obtained from the Maple-tree, is more medicinal, than that obtained from the Weſt India sugar cane; but this opinion I believe is without foundation. It is preferable in its qualities to the Weſt-India sugar only from its superior cleanlineſs. It has been said, that sugar injures the teeth, but this opinion now has so few advocates, that it does not deserve a serious refutation. To transmit to future generations all the advantages which have been enumerated from the Maple-tree, it will be neceſsary to protect it by law, or by a bounty upon the Maple-sugar, from being destroyed by the settlers in the Maple-country, or to transplant it from the woods, and cultivate it in the old and improved parts of the United States. An orchard consisting of 200 trees, planted upon a common farm, would yield more than the same number of apple-trees, at a distance from a market-town. A full grown tree in the woods yields five pounds of sugar a year. If a greater exposure of a tree to the action of the sun, has the same effects upon the Maple, that it has upon other trees, a larger, quantity of sugar might reasonably be expected from each tree planted in an orchard. Allowing it to be only seven pounds; then 200 trees will yield 1400 pounds of sugar, and deducting 200 from the quantity for the consumption of the family, there will remain for sale 1200 pounds, which at 6 90ths of a dollar per pound, will yield an annual profit to the farmer of 80 dollars. But if it should be found that the shade of the Maple does not check the growth of grain any more than it does of graſs, double or treble that number of Maple-trees may be planted on every farm, and a profit proportioned to the above calculation be derived from them. Should this mode of transplanting the means of obtaining sugar be succeſsful, it will not be a new one. The sugar-cane of the Weſt Indies, was brought originally from the Eaſt Indies, by the Portuguese, and cultivated at Madeira; from whence it was transplanted, directly or indirectly, to all the sugar-islands of the Weſt Indies. It were to be wished, that the settlers upon the sugar Maple-lands, would spare the sugar-tree in clearing their lands. On a farm of 200 acres of land, according to our former calculation, there are usually 6000 Maple-trees. If only 2000 of those original and antient inhabitants of the woods were suffered to remain, and each tree were to afford only five pounds of sugar, the annual profit of such a farm in sugar alone, at the price formerly mentioned, would amount to 666 dollars; 150 dollars of which would probably more than defray all the expences of making it, and allow a plentiful deduction for family use. According to the usual annual profit of a sugar Maple-tree, each tree is worth to a farmer *, two dollars and 2-3ds of a dollar; exclusive therefore of the value of the

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* In America, by "farmer," is generally understood the "proprietor," who farms his own land. EDITOR.

BOOK I. Juba was sold for fifteen thousand, and another, which I read of, valued at one hundred and forty thousand H. S. which, at about three halfpence sterling, arrives to a pretty sum; and yet that of the Mauritanian Ptolemie was far richer, containing four feet and a half diameter, three inches thick, which is reported to have been sold for its weight in gold: Of that value they were, and so madly luxurious the age, that when

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farm, the 2000 sugar Maple-trees alone confer a value upon it of 5,333 dollars and 30-90ths of a dollar. It is said, that the sugar-trees, when deprived of the shelter and support they derive from other forest-trees, are liable to be blown down, occasioned by their growing in a rich, and of course a loose soil. To obviate this, it will only be necessary to cut off some of their branches, so as to alter its centre of gravity, and to allow the high winds to have an easy passage through them. Orchards of sugar Maple-trees, which grow with an original exposure of all their parts to the action of the sun, are not liable to this inconvenience."

7. ACER *(PENNSYLVANICUM)* foliis trilobis acuminatis serrulatis, floribus racemosis. Lin. Sp. Pl. 1496. *THE MOUNTAIN MAPLE.*

The body of this tree is slender, and is covered with a whitish bark. It sends forth several red branches, and grows about fifteen feet high. The leaves are three-lobed, pointed, and are unequally and sharply serrated. The flowers come out in longish bunches in the spring; they are of a greenish yellow colour, and are succeeded by seeds which (like those of the Norway Maple) generally fall off before they are ripe. This species is a native of Pennsylvania.

8. ACER *(TARTARICUM)* foliis cordatis indivisis serratis, lobis obsoletis, floribus racemosis. Lin. Sp. Pl. 1495. *THE TARTARIAN MAPLE.*

This species of Maple grows to the height of about twenty feet. The leaves are heart-shaped, undivided, and their edges are unequally serrated. The flowers come out from the wings of the leaves in long bunches. They appear early in the spring, and are sometimes succeeded by ripe seeds in our gardens.

9. ACER *(MONSPESSULANUM)* foliis trilobis integerrimis glabris. Lin. Sp. Pl. 1497. Acer trifolium. C. B. P. 431. *THE MONTPELIER MAPLE.*

The Montpelier Maple grows to about twenty feet high, and is a very beautiful tree. The leaves are composed of three lobes of a shining green, and of a thickish substance; they retain their verdure later in the year than most of the other sorts. The flowers come out in the spring, but have very little beauty; their blow is soon over, and they are sometimes succeeded by seeds which come to perfection in our gardens.

10. ACER *(CRETICUM)* foliis trilobis integerrimis subtus pubescentibus. Lin. Sp. Pl. 1497. *THE CRETAN MAPLE.*

This grows to about the height of the former. The leaves are downy, composed of three lobes, and grow opposite to each other on long downy foot-stalks. The flowers come out in the spring, and are very seldom succeeded by good seeds in England. It is a native of the East.

the men at any time reproached their wives for their wanton expensiveneſs in pearl and other rich trifles, they were wont to retort, and turn the *tables* upon their husbands*. The knot of the timber was the most esteemed, and is said to be much resembled by the Female Cypreſs:—We have now, I am almost persuaded, as beautiful planks of some Walnut-trees near the root; and of Yew, Ivy, Rose-wood, Ash, Thorn,

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The MAPLE, in the Linnæan System, is of the claſs and order *Polygamia Monoecia*.

I have already observed that the common Maple and Sycamore are best raised from seed; but as the seeds of the foreign kinds do not ripen in this country, they should be procured from abroad.—In a cool and shady part of the seminary let beds of fine mould be marked out about four feet in breadth, and with proper alleys. Upon these let the foreign seeds be regularly sown, sifting over them about half an inch of the finest mould. When the plants come up, they should be kept clean from weeds, and frequently watered; and this work must be duly attended to all summer. The spring following, the strongest may be drawn out, and planted in the nursery, in rows two feet asunder, and at the distance of a foot from each other in the rows, leaving the others in the seminary to gain strength. The succeeding spring they must receive the same culture; and they may remain in the nursery, with no other trouble than keeping the ground clean from weeds in the summer, digging between the rows in the winter, and taking off all strong and irregular side-shoots, till they are planted out for good.

Notwithstanding these are the general laws of raising all the species of Maple from foreign seeds, the culture varies with respect to the Scarlet-flowering kind, when the seeds are gathered at home. This species brings its seeds to maturity the beginning of June in our gardens. They should be then gathered, and after having lain a few days to harden, they should be sown in beds of the finest mould, and covered only a quarter of an inch deep. The beds should be hooped, and covered with mats in scorching weather; but when it is rainy and cloudy, they should always be uncovered. In about a month or six weeks many of the plants will appear; but the far greater part will not come up till the following spring. When the summer-plants first show themselves, they should hardly ever feel the full beams of the sun. The beds must be constantly covered with the mats in the day-time, unleſs cloudy and rainy weather happens, when they should always be uncovered; during the night no mats must be put over the plants, that they may have all the benefit of the refreshing dews, air, and cooling showers. When these latter do not fall, watering must be duly attended to; and this is all the trouble they will require for the first summer in the seed-bed. The summer following they may be exposed to all

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* The common expreſsion of *turning the tables* upon a perſon, seems to have originated from what Pliny has remarked upon the Citron, and Bruscum of the Maple: "Confines ei Mauri quibus plurima arbor Citri, et mensarum insania, quas feminæ viris contra Margaritas regerunt." This extravagance in Tables is ridiculed by many of the Poets:

Extremoque epulas *mensa*que petivimis orbe. LUCAN.

BOOK I. and Olive, I have seen incomparable pieces; but the great art was in the seasoning and politure: for which last, the rubbing with a man's hand, who came warm out of the bath, was accounted better than any cloth, as Pliny reports. Some there be who contend, this Citron was a part near the root of the Cedar, which, as they describe it, is oriental and very odoriferous; but most of the learned favour the Citron, and that it grew not far from our Tangier, about the foot of Mount Atlas, whence haply some industrious person might procure of it from the Moors: and I did not forget to put his then Excellency my Lord H. Howard (since his Grace the Duke of Norfolk) in mind of it; who I hoped might have opportunities of satisfying our curiosity; that by comparing it with those elegant woods, which both our own countries and the Indies furnish, we might pronounce something in the controversy: But his not going so far into the country, and the disorder which happened at his being there, quite frustrated this expectation. Here I think good to add, what honest Palisfy philosophises, after his

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weather, when they will only require being kept clean from weeds, and watered in dry seasons. The succeeding spring the strongest may be set out in the nursery-way, like the former seedlings.

By layers also all the species of this genus may be propagated; though that method is never practised for the Common Maple and the Sycamore. The young shoots may be laid down in the autumn, winter, or early in the spring. By the autumn following they will have struck root, and become good plants; when the strongest should be set out in the places where they are to remain; whilst the weakest may be planted in the nursery, like the seedlings, for a year or two, to gain strength.

Maples raised from seeds will grow faster, and arrive at greater height, than those raised from layers; but they will not produce such quantities of flowers; which makes the latter method more eligible for those who want these plants for a low shrubbery.

By cuttings also these trees may be propagated: But this method is chiefly practised on the Ash-leaved and Norway Maples, which more readily take root this way. The cuttings should be the bottom-part of the last year's shoot: They should be taken off early in October, and planted in rows in a moist shady place. The spring and summer following they must be duly watered, as often as dry weather makes it necessary, and be kept clean from weeds. By the autumn they will be fit to remove into the nursery; though if the cuttings are not planted too close, they may remain in their situation for a year or two longer, and then be set out for good, without the trouble of previously planting them in the nursery.

Maples may likewise be propagated by budding, grafting, and inarching: But the other methods being more eligible, these are never practised, except for the variegated sorts.—

plain manner, about the reason of those pretty undulations and chamfers, which we so frequently find in divers woods, which he takes to be the descent, as well as ascent of moisture: For what else, says he, becomes of that water which we often encounter in the cavities, when many branches divaricate, and spread themselves at the tops of great trees, especially pollards, unless, according to its natural appetite, it sink into the very body of the stem through the pores! For example; in the Walnut, you shall find, when it is old, that the wood is admirably figured, and, as it were, marbled; and therefore much more esteemed by the joiners, cabinet-makers, inlayers, &c. than the young, which is paler of colour, and without any notable grain, as they call it: For the rain distilling along the branches, when many of them break out into clusters from the stem, sinks in, and is the cause of these marks, since we find it exceedingly full of pores: Do but plane off a thin chip, or sliver, from one of these old trees, and interposing it betwixt your eye and the light, you shall observe it to be full of innumerable holes,

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This latter is to be continued no otherwise than by budding it on stocks of the Common Sycamore; for the seeds when sown, afford us only the Common Sycamore in return.

In order to propagate the varieties by budding, let some plants of the Common Sycamore, one year old, be taken out of the seminary, and set in the nursery in rows a yard asunder, and the plants about a foot and half distant from each other in the rows: Let the ground be kept clean from weeds all summer, and be dug, or, as the gardeners call it, *turned in*, in the winter; and the summer following the stocks will be of a proper size to receive the buds, which should be taken from the most beautifully-striped branches. The best time for this work is August; because if it is done earlier, the buds will shoot the same summer; and when this happens, a hard winter will infallibly kill them. Having, therefore, budded your stock the middle or latter end of August, with the eyes or buds fronting the north, early in October take off the bass matting, which before this time will have confined the bark and pinched the bud, but not so as to hurt it much. Then cut off the stock just above the bud, and dig the ground between the rows. The summer following, keep the ground clean from weeds; cut off all natural side-buds from the stock as they come out; and by autumn, if the land be good, your buds will have shot forth, and formed themselves into trees four or five feet high. They may then be removed into the places where they are designed to remain.

The Striped Norway Maple should be budded on stocks of its own kind; for on these they take best. Variegated plants are recommended to be planted in poor, hungry, gravelly, or sandy soils, to feed the disease which is supposed to occasion these beautiful stripes: but these trees show their stripes in greater perfection in a good soil: The plant, though in sickness, has the appearance of health; the shoots are vigorous and strong; the leaves are large, less liable to be hurt by insects; and the stripes appear more perfect, natural, and delightful, than those on stunted trees growing on a poor soil.

BOOK I

much more perspicuous and ample by the application of a good microscope*. But above all, notable for these extravagant damaskings and characters, is the Maple; and it is notorious that this tree is very full of branches from the root to its very summit, by reason that it produces no considerable fruit: These arms being frequently cut, the head is more surcharged with them, which spreading like so many rays from a centre, form that hollowneſs at the top of the stem whence they shoot, capable of containing a good quantity of water every time it rains; this sinking into the pores, as was before hinted, is compelled to divert its course, as it paſses through the body of the tree, wherever it encounters the knot of any of these branches which were cut off from the stem; because their roots not only deeply penetrate towards the heart, but are likewise of themselves very hard and impervious; and the frequent obliquity of this course of the subsiding moisture, by reason of these obstructions, is, as may be conceived, the cause of those curious works which we find remarkable in this and other woods, whose branches grow thick from the stem. But for these curious contextures, consult rather the learned Dr. Grew. We have showed how by culture, and stripping up, it arrives to a goodly tree; and surely there were some of them of large bulk, and noble shade, that Virgil should choose it for the court of his Evander (one of his worthiest Princes, in his best of Poems) sitting on his Maple-throne[r]; and when he brings Æneas into the Royal cottage, he makes him this memorable compliment: "Greater," says great Cowley, "than ever was yet spoken at the Escurial, the Louvre, or Whitehall:"

* Not inventᵉd in Paliſsy's days.

——————Hæc, inquit, limina victor
Alcides subiit; hæc illum regia cepit.
Aude, hospes, contemnere opes, et te quoque dignum
Finge Deo, rebusque veni non asper egenis.

This humble roof, this rustick court, said he,
Receiv'd Alcides crown'd with victory:
Scorn not, great guest, the steps where he has trod,
But contemn wealth, and imitate a god.

[r] ——————Solioque invitat acerno, ÆNEID, viii.

The Savages in Canada, when the sap rises in the Maple, by an incision in the tree, extract the liquor; and having evaporated a reasonable quantity thereof (as suppose seven or eight pounds) there will remain one pound as sweet and perfect sugar as that which is gotten out of the cane; part of which sugar has been for many years constantly sent to Rouen in Normandy to be refined: There is also made of this sugar an excellent syrup of Maiden-hair and other capillary plants, prevalent against the scurvy; though Mr. Ray thinks otherwise, by reason of the saccharine substance remaining in the decoction.—See Synops. Stirp. et Dendrolog. de Acere.

CHAP. XIII.

The SYCAMORE[a].

1. THE SYCAMORE, or WILD FIG-TREE, falsely so called, is our Acer majus, or broad-leaved Mas, one of the Maples, and is much more in reputation for its shade than it deserves; for the Honey-dew leaves, which fall early, like those of the Ash, turn to mucilage, producing noxious insects, and putrefy with the first moisture of the season, so as they contaminate and mar our walks; and are therefore, by my consent, to be banished from all curious gardens and avenues. It is raised of the keys in the husk, as soon as ripe, and they come up the first spring; also by roots and layers, in ground moist, not over wet or stiff, and must be governed as other nursery plants.

2. There is in Germany a better sort of Sycamore than ours (nor are ours indigenous) wherewith they make saddle-trees, and divers other things of use. Our own is excellent for trenchers, cart and plough timber, being light, tough, and not much inferior to Ash itself; and if the trees be very tall and handsome, they are the more tolerable for distant walks, especially where other better trees prosper not so well, or where a sudden shade is expected: Some commend them to thicken copses, especially in parks, as least apt to the spoil of deer, and that it is good fire-wood. This tree being wounded, bleeds a great part of the year; the liquor emulating that of the Birch, which happening to few of the rest, (that is, to bleed winter and summer,) I therefore mention: The sap is sweet and wholesome, and in a short time yields sufficient quantity to brew with, so as when it is used, one bushel of malt will make as good ale, as four bushels with ordinary water, upon Dr. Tongue's experience. Phil. Trans. vol. iv. fol. 917.

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[a] This is the ACER *(PSEUDO-PLATANUS)* foliis quinquelobis inæqualiter serratis, floribus racemosis. Lin. Sp. Pl. 1495. It has already been described in the last chapter.

The Sycamore Tree.

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J. Miller del. & Sc.

The Lime Tree.

J. Miller del et Sculp.

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CHAP. XIV.

The LIME[t].

1. TILIA, the LIME-TREE, or LINDEN, is of two kinds; the male (which some allow to be but a finer sort of Maple) is harder, fuller of knots, and of a redder colour, but producing neither flower nor seed, so constantly and so mature with us, as does the female, whose blosom is also very

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[t] Of this GENUS there are only two species:

1. TILIA *(EUROPÆA)* floribus nectario destitutis. Lin. Sp. Pl. 733. *THE LIME, or LINDEN TREE.*

The Lime is a handsome picturesque tree, forming a beautiful cone by its branches, and maintaining its body taper and straight; and as it will grow to a large size, it is very proper to be planted for avenues: It also makes a beautiful detached object in parks and open places. Although the leaves fall off very early in the autumn, yet it immediately makes amends by exhibiting its beautiful and red twigs; for which reason the red-twigged Lime should always be preferred for these purposes. It has also other properties to recommend itself to such situations: The shade is excellent; the branches are so tough, as seldom to be broken by the winds; and if any of them should want occasionally be taken off, no tree heals its wounds sooner. It will sometimes run away from its colour, and grow with green branches, but that is not often the case.—The Lime is best raised from seeds; for those trees raised from layers or from cuttings never grow so handsome, or so fast, as those raised in the seminary. Let the seeds be gathered from thriving healthy trees of the true red-twigged kind, and then by far the greatest part of the young plants will be of that sort. The seeds being ripe in October, let a dry day be made choice of for gathering them. As these grow at the extremity of the branches, it would be tedious to gather them with the hand; they may therefore be beaten down by a long pole, having a large winnowing sheet, or some such thing, spread under the tree to receive them.——When you have got a sufficient quantity, spread them in a dry place for a few days; then having procured a spot of rich garden-ground, and having the mould made fine by digging and raking, let it be raked out of the beds about an inch deep: These beds may be four feet wide, and the alleys a foot and a half. After the mould is raked out, the earth should be gently tapped down with the back of the spade, to make it level; then the seeds should be sown, at about an inch asunder, all over the bed, gently prefsing them down, and covering them about an inch deep.—— In the spring of the year the young plants will make their appearance; when they should be constantly kept clear from weeds, and gently watered in very dry weather. In this seminary they may stand for two years, when they will be fit to plant in the nursery; at which time they should be carefully taken up, their roots shortened, and the young side-branches, if they have shot out any, taken off. They must be planted in the nursery-ground in rows, two feet and a half asunder, and one foot and a half distant in the rows. There they may stand till they are of a proper size to be planted for good; observing always to dig between the rows every winter, and constantly to keep the ground free from weeds. The Lime-tree will grow

BOOK 1. odoriferous, perfuming the air, and the leaf larger; the wood is likewise thicker, of small pith, and not obnoxious to the worm; so as it seems Theophrastus de Plant. lib. iii. cap. x. said true, " That though they " were of both sexes, yet they totally differed as to their form." We send

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well on almost any soil or situation; but if planted in a rich and loamy earth, wherein, like most other trees, it chiefly delights, the growth of it will be almost incredible. This should be a great motive to the planting of this tree; which will, in a very few years, sufficiently reward the industrious planter. Of this species there are three or four varieties.

2. TILIA *(AMERICANA)* floribus nectario instructis. Lin. Sp Pl. 733 *THE AMERICAN LIME-TREE.*

Of this species there are a few varieties, which indeed differ very little in appearance from those of our common European sorts, the leaves of both being heart-shaped.——There is a larger, and a smaller-leaved sort. Their edges are finely serrated, and end in acute points.—These beautiful cordated leaves, that thus run into acute points, have their under surface of a paler green than their upper. The larger-leaved kind is by far the finest sort; and the branches vary from all others of this genus, in that they are covered with a dark-brown bark. The flowers are furnished with nectaria; whereas those of the common Lime-tree have none: They are produced in bunches, like the common sort, and are succeeded by seeds contained in coriaceous capsules.—The American sorts, as well as our own, should be raised from seeds; but when we have not the conveniency of procuring the seeds from abroad, a few plants must be obtained for stools. These should be planted in a light rich soil, if such can be had, for there they will shoot the strongest; though almost any other will do. After these plants have stood a year or two, they should be headed near the ground. They will then shoot out many young branches, which may be layered in the autumn; though if they stand two years, there will be greater plenty of young twigs for layering; for every shoot of the first summer will the year following divide into several. When the layering of these is to be performed, which ought to be in the autumn, the strong two-years shoot must be brought down: and if they are stiff and do not bend readily, they must have a gentle splash with the knife near the bottom; a slit should be made at the joint of every one of the youngest twigs, and their ends bent backwards that the slit may be kept open. This being done, the mould must be levelled among the layers, and the ends of them taken off to within one eye of the ground. The business is then done; and the autumn following they will all have good roots, many of which will be strong, and fit to plant out for good, whilst the weakest may be removed into the nursery-ground, in rows, to gain strength. All the sorts of Lime-trees will also grow from cuttings; but this is found to be an uncertain method; and if it were more certain, still plants raised by them or layers are not near so good as those from seeds.

The LIME-TREE is of the class and order *Polyandria Monogynia*, there being in every flower numerous stamina and only one style.

The flowers begin to open about the fifteenth of May, and are in full blow by the thirteenth of July, when they appear of a white colour, and have a very fragrant smell. These are very grateful to bees, for which reason Virgil in his beautiful description of the industrious Corycian, places the Lime and the Pine in the neighbourhood of his hives.

——————et spumantia cogere pressis
Mella favis; illi tiliæ, atque uberrima pinus.

commonly for this tree into Flanders and Holland; which indeed grows not so naturally wild with us, to our excefsive cost, while our woods do in some places spontaneously produce them; and though of somewhat a smaller leaf, yet altogether as good, and apt to be civilized and made

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The leaves begin to open about the twelfth of April, are quite out by the eighteenth of the same month, and fall off very early in the autumn.

The timber of the Lime-tree is used by the carver, it being a soft light wood, as also by architects for framing the models of their buildings; the turners likewise use it for making light bowls, dishes, &c. but it is too soft for any strong purpofes.

These trees will continue growing, and remain sound a great number of years; and, if planted in a good loamy soil, will grow to a considerable bulk. Mr. Miller measured a Lime which was near ten yards in girth two feet above the ground, and was then in a very thriving condition; and Sir Thomas Brown mentions one of these trees which grew in Norfolk, that was sixteen yards in circumference a foot and a half above the ground, and in the least part of the trunk eight yards and a half. It was in height thirty yards. There is a large Lime-tree now growing in the heights above Villars, a seat belonging to Mr. Graffenred of Berne, near Morat. It measures 36 feet in circumference, and in height is nearly ninety feet. In the pleasure-ground of the Palace at Bishopthorpe, belonging to the Archbishop of York, there is a noble walk of stately Lime-trees, which, as far as I know, exceeds any thing of the kind in this island.

——————a pillar'd shade
High over-arched.—————— PARADISE LOST.

It was customary with the antients to crown themselves with garlands of roses and other flowers during their convivial entertainments, and these were artfully bound together with slips of the inner rind of the Lime-tree.

Ebrius incinctis philyra conviva capillis
Saltat, et imprudens utitur arte meri. OV. FAST.

Displicent nexæ philyra coronæ. HOR.

Suetonius relates that Nero spent upwards of 4,000,000 of sesterees, or about 30,000l. at one supper, in roses. But it should be remarked that it was then the fashion, as now, to procure them prematurely, or out of season.

Mitte sectari rosa quo locorum
Sera moretur. HOR.

Dat festinatas, Cæsar, tibi bruma coronas.
Quondam veris erant, nunc tua facta rosa est. MART.

When the Emperor Julian entered Constantinople, he found the whole Imperial Court immersed in the deepest luxury. Mamertinus tells us, that they had their miracula avium, longinqui maris pisces, alieni temporis poma, æstivæ nives, and *hybernæ rosæ*.

more florid: From thence I have received many of their berries; so as it is a shameful negligence, that we are not better provided of nurseries of a tree so choice and universally acceptable: For so they may be raised either of the seeds in October, or, with better succeſs, by the suckers and plants, which are treated after the same method, and in as great abundance as the Elm, like to which it should be cultivated. You may know whether the seeds be prolific, by searching the husk; if on biting, or cutting it asunder, it be full and white, and not husky, as sometimes we find the foreigners, the seeds are good. Be sure to collect your seed in dry weather, airing it in an open room, and reserving it in sand (as has been taught) till the middle of February, when you may sow it in pretty strong, fresh, and loamy mould, kept shaded and moist, as the season requires, and clear of weeds; and at the period of two years plant them out, dressed and pruned, as discretion shall advise. But not only by the suckers and layers at the roots, but even by branches lopped from the head, may this tree be propagated; and peeling off a little of the bark, at a competent distance from the stem or arms, and covering it with loam mingled with rich earth, they will shoot their fibres, and may be seasonably separated: But to facilitate this and the like attempts, it is adviseable to apply a ligature above the place when the sap is ascending, or beneath it when it (as they say vulgarly) descends. From June to November you may lay them; the scrubs and leſs erect do excellently to thicken copses, and will yield lusty shoots and useful fire-wood.

2. The Lime-tree affects a rich feeding loamy soil; in such ground its growth will be most incredible for speed and spreading. It may be planted as big as one's leg, and its head topped at about six or eight feet bole; thus it will become, of all other, the most proper and beautiful for walks, as producing an upright body, smooth, and even bark, ample leaf, sweet bloſsom, the delight of bees, and a goodly shade at the distance of eighteen or twenty-five feet. It is also very patient of pruning; but if it taper over much, some of the collateral boughs should be cut off to check the sap, which is best to be done about Midsummer; and to make it grow upright, take off the prepondering branches with discretion; and so you may correct any other tree, and redreſs its obliquity. The root, in transplanting, should not be lopped; and this, says Mr. Cook, is a good leſson for all young-planted trees.

3. The Prince Elector did lately remove very great Lime-trees out of one of his forests at Heidelberg, to a steep hill, exceedingly exposed to the heat of the sun, and that in the midst of summer: They grow behind that strong tower on the south-west and most torrid part of the eminence, being a dry, reddish, and barren earth, yet do they prosper rarely well: But the heads were cut off, and the pits into which they were transplanted were (by the industry and direction of Monsieur De Son, a Frenchman, and an admirable mechanician, who himself related it to me) filled with a composition of earth and cow-dung, which was exceedingly beaten, and so diluted with water, as it became almost a liquid pap: It was into this that he plunged the roots, covering the surface with the turf: A singular example of removing so great trees at such a season, and therefore taken notice of here expresly. Other perfections of the tree, besides its unparalleled beauty for walks, are, that it will grow in almost all grounds; that it lasts long; that it soon heals its scars; that it affects uprightness; that it stoutly resists a storm; that it seldom becomes hollow.

4. The timber of a well-grown Lime is convenient for any use that the willow is; but much to be preferred, as being stronger and yet lighter; whence Virgil calls them *Tilias leves*; and therefore fit for yokes[u]. They are turned into boxes for the apothecaries. Columella commends *Arculas Tiliaceas*. And because of its colour and easy working, and that it is not subject to split, architects make with it models for their designed buildings; and the carvers in wood use it not only for small figures, but large statues and entire histories in bass and high relieve: witness, besides several more, the lapidation of St. Stephen, with the structures and elevations about it; the trophies, festoons, fruitages, encarpia, and other sculptures in the frontoons, freizes, capitals, pedestals, and other ornaments and decorations, of admirable invention and performance, to be seen about the choir of St. Paul's and other churches, royal palaces, and noble houses in city and country; all of them the works and invention of our Lysippus, Mr. Gibbon, comparable, and, for ought appears, equal to any thing of the antients. Having had the honour (for so I account it) to be the

[u] ——et tilia ante jugo levis——

BOOK I. first who recommended this great artist to his Majesty Charles II. I mention it on this occasion with much satisfaction. With the twigs, they make baskets and cradles, and of the smoother side of the bark, tablets for writing; for the antient Philyra is but our Tilia, of which Munting affirms he saw a book made of the inward bark, written about a thousand years since. Such another was brought to the Count of St. Amant, Governor of Arras, 1662, for which there were given eight thousand ducats by the Emperor; it contained a work of Cicero, *De ordinanda Republica, et de inveniendis orationum exordiis;* a piece inestimable, but never published, and now in the library at Vienna, after it had formerly been the greatest rarity in that of the late Cardinal Mazarine. Other papyraceous trees are mentioned by West-Indian travellers, especially in Hispaniola, Java, &c. whose inward bark not only exceeds our largest paper for breadth and length, and may be written on both sides, but is comparable to our best vellum.— Bellonius says, That the Grecians made bottles of the Tilia, which they finely rosined within-side. It makes pumps for ships, also lattices for windows; Shoemakers use dreſsers of the plank to cut leather on, as not so hard as to turn the edges of their knives; and even the coarsest membrane, or slivers of the tree growing betwixt the bark and the main body, they now twist into baſs ropes; besides, the truncheons make a far better coal for gunpowder than those of Alder itself: Scriblets for painters first draughts are also made of its coals: and its extraordinary candor and lightneſs, has dignified it above all the woods of our forest, in the hands of the Right Honourable the White-staff Officers of his Majesty's Imperial Court. The royal plantations of these trees in the parks of Hampton-Court and St. James's will sufficiently instruct any man how these (and indeed all others which stand single) are to be governed and defended from the injuries of beasts, and sometimes more *unreasonable* creatures, till they are able to protect themselves.— In Holland, where the very highways are adorned with them, they frequently clap three or four deal-boards, in manner of a close trunk, about them, but it is not so well; because it keeps out the air, which should have free acceſs and intercourse to the bole, and by no means be excluded from flowing freely about them, or indeed any other trees, provided they are secured from cattle, and the violence of impetuous winds, &c. as his Majesty's are, without those close coffins in which the

Dutchmen seem rather to bury them alive: In the mean time, is there a more ravishing or delightful object, than to behold some entire streets and whole towns planted with these trees, in even lines before their doors, so as they even seem like cities in a wood? This is extremely fresh, of admirable effect against the epilepsy, for which the delicately scented blossoms are held prevalent, and skreen the houses both from winds, sun, and dust; than which there can be nothing more desireable where streets are much frequented: For thus

> Stat Philyra; haud omnes formosior altera surgit
> Inter Hamadryadas; molissima, candida, lævis,
> Et viridante comâ et beneolenti flore superba,
> Spargit odoratam latè atque æqualiter umbram. COULEII, lib. vi. Pl.
>
> The stately Lime, smooth, gentle, straight, and fair,
> (With which no other Dryad can compare)
> With verdant locks, and fragrant blossoms deckt,
> Does a large, even, odorate shade project.

Diræ and curses therefore on those inhuman and ambitious tyrants, who, not contented with their own dominions, invade their peaceful neighbours, and send their legions, without distinction, to destroy and level to the ground such venerable and goodly plantations, and noble avenues. Irreparable marks of their barbarity!

The distance for walks, as we said, may, in rich ground, be twenty-five feet; in more ordinary soil, eighteen or twenty. For a most prodigious tree of this kind, see book iii. chap. iii.

The berries, reduced to powder, cure the dysentery, and stop bleeding at the nose. The distilled water is good against the epilepsy, apoplexy, vertigo, trembling of the heart, and gravel. Schroder commends a mucilage of the bark for wounds, and of the leaves and bark he says, *urinam ac menses cient.* I am told the juice of the leaves fixes colours.

CHAP. XV.

The POPLAR, ASPEN, and ABELE[x].

1. POPULUS, the POPLAR. I begin this second clafs, according to our former distribution, with the Poplar, of which there are several kinds, White, Black, &c. (which in Candy it is reported bears seed,) besides the Aspen. The White, (famous heretofore for yielding its umbram

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[x] The POPLAR is the most valuable of all the aquatics, whether we consider the quickneſs of its growth, or the magnitude to which it will arrive: And although this tree is styled an Aquatic, yet it will grow exceedingly well, and attain an extraordinary bulk in a few years, on ground tolerably dry.

There are five species of Poplar, though I shall recommend only three to be planted for timber. These are, the White Poplar, known by the name of the Abele-tree; the Black Poplar, so called from a black circle perceived at the centre of its trunk when felled; and the Trembling Poplar, or Aspen-tree.

1. POPULUS *(ALBA)* foliis subrotundis, dentato-angulatis subtus tomentosis. Lin. Sp. Pl. 1463. *Poplar-tree with roundish leaves, which are angularly indented, and downy on their under side.* Populus alba majoribus foliis. C. B. P. 429. *WHITE POPLAR WITH LARGER LEAVES*, commonly called the *ABELE-TREE*.

The trunk of the White Poplar is straight, and covered with a smooth whitish bark. The leaves are about three inches long, and stand upon foot-stalks about an inch in length: they are indented at the edges; are of a dark green on the upper surface, but white and woolly underneath. They are usually quite out by the eighteenth of April.

2. POPULUS *(NIGRA)* foliis deltoidibus acuminatis serratis. Lin. Sp. Pl. 1464. *Poplar with pointed sawed leaves, shaped like the letter Delta.* Populus nigra. C. B. P. 429. *THE BLACK POPLAR.*

The leaves of the Black Poplar are not so large as the former; their colour is a pleasant green; they are heart-shaped, and appear about the 22d of April.

3. POPULUS *(TREMULA)* foliis subrotundis, dentato-angulatis utrinque glabris. Lin. Sp. Pl. 1464. *Poplar-tree with roundish leaves, which are angularly indented, and smooth on both sides.* Populus tremula. C. B. P. 429. *TREMBLING POPLAR, or ASPEN-TREE.*

The leaves of the Aspen are smaller than those of the Black Poplar. These stand upon long slender foot-stalks, which renders it, of all the other sorts, the most tremulous; they are roundish, and smooth on both sides; but do not make their appearance before the beginning of May.

The White Poplar Tree.

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J. Miller del. & sc.

hospitalem) is the most ordinary with us, to be raised in abundance by every set or slip. Fence the ground as far as any old Poplar-roots extend, and they will furnish you with suckers innumerable, to be slipped from their mothers, and transplanted the very first year; but if you cut down an old tree, you shall need no other nursery. When they are young, their leaves are somewhat broader and rounder, as most other trees are, than when they grow aged. In moist and boggy places they will flourish wonderfully, so the ground be not spewing; but especially near the margins and banks of rivers, [*Populus in fluviis*——] and in low, sweet, and fertile grounds, yea, and in the drier likewise. Truncheons of seven

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The flowers of the POPLAR are male and female, on distinct plants, and the male flowers have eight stamina, which shows that it belongs to the clafs and order *Dioecia Octandria*. Both the male and female flowers are arranged into an amentum. In the beginning of April they make their appearance; though the Aspen-flowers will be full blown by the twenty-second of March. The male flowers appear first, and the female about a week after. The catkins are about three inches long. Soon after the female flowers come out, the males drop off; and in about five or six weeks the female will have ripe seeds, which are dispersed by the winds to a considerable distance.

The propagation of the Poplar-tree is very easy. It will grow from cuttings, suckers, and truncheons; though I by no means approve of the planting of truncheons, as often practised on boggy places; because I have always observed, that plantations of these luxuriant trees, attempted to be raised in this manner, have been frequently stocked; and that the most promising trees have never equalled, in goodnefs or beauty, such as had been raised in the nursery.

In order, therefore, to obtain a quantity of Poplars, proper to be planted in avenues or clumps, by the sides of rivulets, bogs, or any other places where they are desired, you must get a piece of ground double dug for the nursery. If the trees are intended for a watery situation, this nursery-ground should be pretty near it; but if they are designed for pasture-grounds, fields, or such as have no more than a common degree of moisture, the soil of the nursery should be proportionably drier.

Spring is the best season for planting the cuttings; though they will grow if planted in any of the winter months. They should all be vigorous shoots of the last year, or at least not older than two years. These cuttings should be one foot and a half in length; and must be planted in the nursery-ground in rows, a yard asunder, and at a foot and a half distant from each other in the rows. They should be planted a foot in the ground, and the other part should remain above to send forth the leading-shoot. Now, in order to have one leading-shoot only, the plants should be carefully looked over in summer, and all young side-branches nipped off, in order to encourage the leading branch. After this, no farther care need be taken of them than keeping them clean of weeds, and digging between the rows in winter, till they have attained a proper size to plant out for good, which will

BOOK I. or eight feet long, thrust two feet into the earth, (a hole being made with a sharp hard stake, filled with water, and then with fine earth prefsed in, and close about them,) when once rooted, may be cut at six inches above ground; and thus placed at a yard distant, they will immediately

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be in two years, if they are designed to form small woods, or spinneys, in boggy or watery grounds.

If they are wanted as standards, for fields, sides of rivers, &c. they may remain in the nursery another year, when they may be taken out and planted; and in a few years they will make a surprising progrefs, so as to be worth, in about twenty or thirty years, as many shillings a-piece.

In order to form a coppice of these trees, if the land be not so boggy but that it may be ploughed, a crop of oats or other grain may be got off it the preceding year of planting; and in the autumn it would be a still greater advantage, if, just before the planting, it was to be ploughed again; as by this operation it would be rendered lighter, and the weeds, &c. would be buried. Having prepared the ground, let the two-year old plants be taken out of the nursery, and planted one yard asunder. It will be proper to continue hoeing the weeds down for the first year: Afterward, they will require no farther trouble till the time of cutting, which may be in seven years from the first planting; and every four or five years after they may be cut for poles, fire-wood, &c. The quickneſs of the growth of these trees, and their value when cut, even for these purposes, greatly augment the value of the land planted with them: Nay, by this means boggy or marshy ground will produce more per acre than the best pasture or feeding land; a consideration which should stimulate every Gentleman poſsefsed of a large quantity of such sort of land, which brings him in very little, to improve in this manner. If the ground for these plantations be so boggy as not to admit of ploughing and sowing, then the planter must be contented with taking the plants out of the nursery, and setting them in holes at the aforesaid distance; and they will thrive surprisingly even in this way.

Every Gentleman desirous of having plantations of large trees of the sorts I have recommended, should plant them as before directed, at one yard asunder; and when their heads begin to interfere and incommode one another, every other tree should be taken away, which will sell for large poles; and the remainder should be left to grow for timber. But though I advise every other tree to be taken away, I would not have this caution too strictly observed: I only mean to have the weakest and least thriving eradicated; and if two fine luxuriant trees should stand together, with others leſs promising on each side, let the weakest be taken up. And thus they should continue to be thinned as often as they grow too close, till you have a plantation of timber Poplar-trees.

I must not forget to give another precaution to the Poplar planter, viz. That after these trees are planted out for good, he should never suffer a tree to be stripped up, nor even a side-branch taken off; for by doing this, the progreſs of the tree will be stopped for some years; whereas, if these are permitted to remain, they will powerfully attract the nutritious juices of the atmosphere, and help to supply the trunk, as well as themselves, in such plenty, as to contribute surprisingly to the increase of the tree. Boards made of Poplar are

furnish a kind of copse: But in case you plant them of rooted trees, or smaller sets, fix them not so deep; for though we bury the truncheons thus profound, yet is the root which they strike commonly but shallow. They will make prodigious shoots in fifteen or sixteen years; but then

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durable, if kept dry, and the poles make tolerable spars after the bark has been carefully removed. The bark, when permitted to remain upon poles of soft wood, harbours animalculæ, which in time eat away the strength of the timber.

4. POPULUS *(BALSAMIFERA)* foliis subcordatis denticulatis. Lin. Sp. Pl. 1464. *THE CAROLINA POPLAR.*

This Poplar grows to a large timber-tree, and has a peculiar majesty. It is an exceedingly swift grower, insomuch that it has been known to shoot ten feet in the space of one summer. The bark is smooth, and of a whitish colour; though that on the young shoots is of a fine green. The young shoots have five angles. The bark of which these are composed, being extended by the future growth, leaves the traces of these angles on the older branches; and this gives the tree in winter a particular look; for at the base of each bud they curve over and meet. Thus, between every bud, there are formed figures like niches of public buildings, with an upright in the middle, at the top of which, like an ornament, is seated the bud for the future shoot. Of all the trees in a collection, no one more agreeably entertains us by its leaves than this, whether we consider the colour, figure, or size. Their colour is a light shining green, which is heightened in the autumn, by the strong mid-rib, and the large veins that issue from it, turning to a red; the lesser veins also being in some degree affected, occasion upon the same leaf an agreeable contrast. They are heart-shaped, and notched at the edges. But the size of the leaves gives this tree its greatest dignity: These majestic leaves are placed alternately on the branches; though, as the tree advances in height, they diminish in size. This species shoots late in the autumn; and the young shoots have their ends often killed in hard winters, which is an imperfection, as it causes the tree to have a very bad look in the spring, both before and when the leaves are putting out: These, however, when they appear, make ample amends for the former defect. The flowers afford no beauty, being only catkins, like other Poplars.

5. POPULUS *(HETEROPHYLLA)* foliis cordatis primoribus villosis. Lin. Sp. Pl. 1464. *THE VIRGINIA POPLAR.*

This species of Poplar also forms a large timber-tree. The branches are numerous, veined, and angular. The leaves are heart-shaped, broad, slightly serrated, and downy on their first appearance. The flowers come out in loose catkins, and make little show; they appear early in the spring, and are succeeded by numerous downy seeds, which are carried by the winds to a considerable distance:

> " Arise, ye winds, 'tis now your time to blow,
> " And aid the work of nature: On your wings
> " The pregnant seeds conveyed shall plant a race
> " Far from their native soil."

The Lombardy, or Po Poplar, is another species of this tree; but there are none in this

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the heads must by no means be diminished, but the lower branches may, yet not too far up; the foot should also be cleansed every second year: This for the White. The Black Poplar is frequently pollared, when as big as one's arm, eight or nine feet from the ground, as they trim them in Italy for their Vines to serpent and twist on; and those they poll, or head, every second year, sparing the middle, straight, and thrivingest shoot, and at the third year cut him also. There be yet that condemn the pruning of this Poplar, as hindering its growth.

2. The shade of this tree is esteemed very wholesome in summer, but they do not become walks or avenues, by reason of their suckers, and that they foul the ground at the fall of the leaf; but they should be planted in barren woods, and to flank places at a distance, for their increase, and the glittering brightneſs of their foliage: The leaves are good for cattle, which must be stripped from the cut boughs before they are fagotted.

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kingdom of a sufficient age to enable us to fix the standard of its excellence. So far as we yet know, it promises to answer the high character given of its quick growth.

All the foreign Poplars grow very freely in this country, and, like the others, are propagated by cuttings and layers.

The Poplar was sacred to Hercules, "Populus Alcidæ gratiſsima;" and when any ceremonies were instituted in honour of that god, its tender branches and leaves were twined round the heads of the votaries:

Tum Salii ad cantus, incensa altaria circum,
Populeis adsunt evincti tempora ramis. ÆNEID, viii. ver. 285.

It was customary with lovers to write verses upon the bark of different trees. Ovid, in the epistle from Oenone to Paris, fixes upon the Poplar:

Populus est, memini, fluviali consita ripa,
Est in qua nostri litera scripta memor.
Populе, vive, precor, quæ consita margine ripæ
Hoc in rugoso cortice carmen habes:
Cum Paris Oenone poterit spirare relicta,
Ad fontem Xanthi versa recurret aqua.

Homer beautifully compares the fall of Simoisius, by the hand of Ajax, to a Poplar just cut down:

So falls a Poplar, that in wat'ry ground
Rais'd high the head, with stately branches crown'd,
(Fell'd by some artist with his shining steel,
To shape the circle of the bending wheel)
Cut down it lies, tall, smooth, and largely spread,
With all its beauteous honours on its head. POPE.

This to be done in the decrease of October, and reserved in bundles for winter fodder. The wood of the White Poplar is sought of the sculptor, and they saw both sorts into boards, which, where they lie dry, continue a long time. Of this material they also made shields of defence in sword and buckler days. Dioscorides writes, that the bark chopped small, and sowed in rills, well and richly manured and watered, will produce a plentiful crop of Mushrooms; or warm water, in which yest is dissolved, cast upon a new-cut stump. It is to be noted that those fungi, which spring from the putrid stumps of this tree, are not venenous, (as of all or most other trees they are,) being gathered after the first autumnal rains. There is a Poplar of a paler green, and is the most proper for watery ground; it will grow of truncheons from two to eight feet long, and, bringing a good lop in a short time, is by some preferred to Willows.

For the setting of these Mr. Cook advises the boring of the ground with a sort of auger, to prevent the stripping of the bark from the stake in planting; a foot and a half deep, or more if great, (for some may be eight or nine feet,) for Pollards, cut sloping, and free of cracks at either end. Two or three inches diameter is a competent bigness, and the earth should be rammed close to them.

Another expedient is by making drains in very moist ground, two spade deep and three feet wide, casting up the earth between the drains, sowing it the first year with oats to mellow the ground; the next winter setting it for copse, with these, any, or all the watery sorts of trees. Thus, in four or five years, you will have a handsome fell; and so successively. It is in the former author, where the charge is exactly calculated, to whom I refer the reader. I am informed that in Cheshire there grow many stately and straight Black Poplars, that yield board and planks of an inch and a half thickness; so fit for flooring of rooms, as by some preferred to Oak, for the whiteness and lasting, where they lie dry.

3. They have a Poplar in Virginia of a very peculiar shaped leaf, as if the point of it were cut off, which grows very well with the curious amongst us to a considerable stature. I conceive it was first brought over by John Tradescant, under the name of the Tulip-tree, (from the likeness of its flower,) but is not, that I find, taken much notice of in any

BOOK I. of our herbals. I wish we had more of them, but they are difficult to elevate at first [y].

4. The Aspen only (which is that kind of Lybica, or White Poplar, bearing a smaller and more tremulous leaf, by the French called La Tremble, or Quaker,) thrusts down a more searching foot, and in this likewise differs, that it takes it ill to have its head cut off. Pliny would have short truncheons couched two feet in the ground, but first two days dried, at one foot and a half distance, and then moulded over.

5. There is something of a finer sort of White Poplar, which the Dutch call Abele, and we have of late much of it transported out of Holland. These are also best propagated of slips from the roots, the least of which will take, and may in March, at three or four years growth, be transplanted.

6. In Flanders (not in France, as a late author pretends) they have large nurseries of them, which first they plant at one foot distance, the mould light and moist, by no means clayey; in which though they may shoot up tall, yet for want of root they never spread: for, as I said, they must be interred pretty deep, not above three inches above ground, and

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[y] This tree is called by Linnæus *LIRIODENDRON* (TULIPIFERA) *foliis lobatis*. Herman calls it *TULIPIFERA ARBOR VIRGINIANA;* and Plukenet and Catesby, *TULIPIFERA VIRGINIANA, tripartito aceris folio; media lacinia velut abscisa;* also *TULIPIFERA CAROLINIANA, foliis productioribus magis angulosis.* *THE TULIP-TREE.* It is of the class and order *Polyandria Polygynia.*

The Tulip-tree is a native of North America: It is a tree of the first magnitude, and is generally known through all the American States by the title of Poplar. Of late years there have been great numbers of these trees raised from seeds in the English gardens, so that now they are become common in the nurseries about London; and there are many of them in several parts of England which do annually produce flowers. The first tree of this kind which flowered here, was in the gardens of the late Earl of Peterborough, at Parsons Green, near Fulham, which was planted in a wilderness among other trees; before this was planted in the open air, the few plants which were then in the English gardens were planted in pots, and housed in winter, supposing they were too tender to live in the open air; but this tree, soon after it was placed in the full ground, convinced the gardeners of their mistake, by the great progress it made, while those which were kept in pots and tubs increased slowly in their growth; so that afterward there were many others planted in the full ground, which are now arrived to a large size, especially those which were planted in a moist soil. One of the handsomest trees of this kind, near London, is in the garden of Waltham Abbey; and at Wilton, the seat of the Earl of Pembroke, there are some trees of great bulk; as also at Bishopthorpe, the palace of the Archbishop of York. The old tree at Parsons Green is quite

kept clean by pruning them to the middle shoot for the first two years, and so till the third or fourth. When you transplant, place them at eight, ten, or twelve feet interval. They will likewise grow of layers, and even of cuttings in very moist places. In three years they will come to an incredible altitude; in twelve be as big as your middle; and in eighteen or twenty arrive to full perfection. A specimen of this advance we have had of an Abele-tree at Sion, which being lopped in February 1651, did, by the end of October 1652, produce branches as big as a man's wrist, and seventeen feet in length; for which celerity we may recommend them to such late builders as seat their houses in naked and unsheltered places, and that would put a guise of antiquity upon any new inclosure; since by these, whilst a man is on a voyage of no long continuance, his house and lands may be so covered as to be hardly known at his return. But as they thus increase in bulk, their value, as the Italian Poplar has taught us, advances likewise; which, after the first seven years, is annually worth twelve-pence more: So as the Dutch look upon a plantation of these trees as an ample portion for a daughter, and none of the least effects of their good husbandry; which truly may very well be allowed, if that calculation hold, which the late worthy Knight* has asserted, who began his plantation not long since about Richmond, that

* Sir Richard Weston.

destroyed by the other trees which were suffered to over-hang it, and rob it of its nourishment, from the fear of taking them down, lest, by admitting the cold air, the Tulip-tree might be injured.—The young shoots of this tree are covered with a smooth purplish bark; they are garnished with large leaves, whose foot-stalks are four inches long; they are ranged alternate; the leaves are of a singular form, being divided into three lobes; the middle lobe is blunt and hollowed at the point, appearing as if it had been cut with scifsors. The two side-lobes are rounded, and end in blunt points. The leaves are from four to five inches broad near their base, and about four inches long from the foot-stalk to the point, having a strong mid-rib, which is formed by the continuation of the foot-stalk. From the mid-rib run many transverse veins to the borders, which ramify into several smaller. The upper surface of the leaves is smooth, and of a lucid green; the under is of a pale green. The flowers are produced at the end of the branches, and are composed of six petals, three without and three within, which form a sort of bell-shaped flower, whence the inhabitants of North America give it the title of Tulip. These petals are marked with green, yellow, and red spots, and make a fine appearance when the trees are well charged with flowers. This tree flowers in July, and when the flowers drop, the germen swells and forms a kind of cone, but these seldom ripen in England.——Mr. Catesby, in his Natural History of Carolina, says, "There are some of these trees in America which are thirty feet in circumference; the "boughs are unequal and irregular, making several bends or elbows, which render the trees "distinguishable at a great distance, even when they have no leaves upon them. They are "found in most parts of the northern continent of America, from the Cape of Florida to New "England, where the timber is of great use, the trunk being frequently hollowed, and made "into boats big enough to carry a number of men."

BOOK I. thirty pounds being laid out in these plants, would render at least ten thousand pounds in eighteen years; every tree affording thirty plants, and every of them thirty more, after each seven years improving twelvepence in growth till they arrive to their *acme*.

7. The Black Poplar grows rarely with us; it is a stronger and taller tree than the White, the leaves more dark, and not so ample. Divers stately ones of these, I remember about the banks of the Po in Italy; which flourishing near the old Eridanus, (so celebrated by the Poets,) in which the temerarious Phaëton is said to have been precipitated, doubtless gave argument to that fiction of the metamorphosis of his sad sisters, and the amber of their precious tears [z]. It was whilst I was passing down that river towards Ferrara, that I diverted myself with this story of the

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[z] It does not appear from Ovid that the sisters of Phaëton were changed into POPLARS. The supposition probably arose from observing the banks of the Eridanus, or Po, covered with these trees. Others again say, that they were changed into Larches, and this supposition seems as probable as the other; for Vitruvius remarks, "Larix vero, non est "notus nisi his municipibus, qui circa ripam fluminis Padi et litora maris Adriatici." In a medal of Publius Accoleius Lariscolus, the three Sisters (Heliades) are represented as transformed into Larches; and Montfaucon quotes Palladius as saying, "Resina illa "liquida est lacrymæ similis; non recipit flammam, quasi odio persequatur, ob combustum "Phaëthontem." This sentence, however, I do not find in Palladius. He only says, speaking of Larches, "Neque enim flammam recipiunt, aut carbones creare posunt." Lib. xii. tit. xv. Ovid thus describes the tears of the sorrowful sisters:

Inde fluunt lacrymæ: stillataque sole rigescunt
De ramis electra novis: quæ lucidus amnis
Excipit, et nuribus mittit gestanda Latinis. MET. lib. ii.

Virgil in one place says, that the sisters were changed into ALDERS; and in another, that they were transformed into POPLARS; so that it is probable the Poets chose such aquatics as best suited their purpose:

Tum Phaëthontiadas musco circumdat amaræ
Corticis, atque solo proceras erigit alnos. ECL. vi.

Populeas inter frondes umbramque Sororum
Dum canit———— ÆNEID, x.

Our countryman Cowley, in his elegant Latin poem upon Plants, makes choice of the Alder:

Ambusti memor, ac casu perterrita Fratris,
Multa gaudet aqua, et vivit secura sub undis. LIB. vi.

ingenious Poet. I am told there is a Mountain Poplar much propagated in Germany about Vienna, and in Bohemia, of which some trees have yielded planks of a yard in breadth: Why do we procure none of them? CHAP. XV.

8. The best use of the Poplar and Abele, (which are all of them hospitable trees, for any thing thrives under their shade,) is for walks and avenues about grounds which are situated low, and near the water, till coming to be very old, they are apt to grow knurry, and out of proportion. The timber is incomparable for all sorts of white wooden veſsels, as trays, bowls, and other turners' ware; and of especial use for the bellows-maker, because it is almost of the nature of cork, and for ship-pumps, though not very solid, yet very close, and yet so light as it may be used for the soles, as well as heels, of shoes. *Vitruvius, l. de materie cædenda*, reckons it among the building-timbers, *quæ maximè in ædificiis sunt idoneæ*. It is proper for carts, because it is exceedingly light; also for Vine and Hop-props, and divers vimineous works. The loppings in January are for the fire; and therefore such as have proper grounds may, with ease, and in a short time, store themselves for a considerable family, where fuel is dear: But the truth is, it burns untowardly, and rather moulders away than maintains a solid heat. Of the twigs, with the leaves on, are made brooms. The catkins attract the bees, as do also the leaves, especially of the black, being more tenacious of the mildews than most forest-trees, the Oak excepted.

Of the Aspen, our woodmen make hoops, fire-wood, coals, &c.; and the bark of young trees, in some countries, serves for candle or torch-wood.

The juice of Poplar-leaves, dropped into the ears, aſsuages the pain; and the buds contused, and mixed with honey, is a good collyrium for the eyes; as the unguent to refrigerate and cause sleep.

One thing more of the White Poplar is not to be paſsed over, viz. that the seeds of Mistletoe being put into holes bored in the bark of this tree, have produced the plant.——An experiment sufficient to determine that so long controverted question concerning spontaneous and equivocal generation. Vide D. Raii H. P. Append. p. 1918.

CHAP. XVI.

The QUICK-BEAM[a].

1. THE QUICK-BEAM, ORNUS, or, as the Pinax more peculiarly terms it, Fraxinus Bubula, others the Wild Sorb and Witchen, is a species of Wild Ash. The berries which it produces in October may then be sown, or rather the sets planted. I have store of them in a warm grove of mine, and they are of singular beauty. It rises to a reasonable stature, shoots upright and slender, and consists of a fine smooth bark. It delights to be both in mountains and woods, and to fix itself in good light grounds. Virgil affirms it will unite with the Pear.

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[a] This is the SORBUS *(aucuparia)* foliis pinnatis, utrinque glabris. Lin. Sp. Pl. 683. *Service-tree with winged leaves, which are smooth on both sides.* Sorbus sylvestris, foliis domesticæ similis. C. B. P. 415. *Wild Service with leaves like the cultivated;* commonly called QUICKEN, QUICK-BEAM, MOUNTAIN ASH, and in the north, ROWAN TREE.

The Quick-beam grows naturally in many parts of England; but in the southern counties it is seldom seen of any great magnitude, being commonly cut down, and reduced to underwood; but in the North of England and Wales, where the trees are permitted to grow, they arrive at a considerable size. The stems are covered with a smooth grey bark; the branches while young have a purplish brown bark, and the leaves are winged; they are composed of eight or nine pair of long narrow lobes, terminated by an odd one; the lobes are about two inches long, and half an inch broad toward their base ending in acute points, and are sharply sawed on their edges; the leaves on the young trees in the spring, are hoary on their under side, which about Midsummer goes off, but those upon the older branches have very little at any season. The flowers are produced in large bunches, almost in form of umbels, at the end of the branches; they are composed of five spreading concave petals shaped like those of the Pear-tree, but smaller; these are succeeded by roundish berries, growing in large bunches, which have a depressed naval on the top, and turn red in autumn when they ripen.

The buds of this tree begin to open about the beginning of April. The leaves are out by the middle of the month, and the flowers are in full blow by the sixth of May. There are three styles and twenty stamina inserted into the Calyx, which shows that this tree belongs to the class and order *Icosandria Trigynia.*

The QUICK-BEAM is raised from seeds sown as soon as ripe, in beds properly prepared. These frequently remain till the second spring before they make their appearance; and in the spring following they should be put out into the nursery. It is sometimes raised from layers; but when cultivated in that manner, the trees are neither so handsome nor

The Quicken Tree.

T. Miller del. & sc.

Published Jan.ry 1st 1770 by A. Hunter M.D. as the Act directs.

2. Besides the use of it for the husbandman's tools, goads, &c. the wheel-wright commends it for being all heart; if the tree be large, and so well grown as some there are, it will saw into planks, boards, and timber; our Fletchers commend it for bows next to Yew, which we ought not to pafs over, for the glory of our once English ancestors: In a statute of Henry VIII. you have it mentioned. It is excellent fuel; but I have not yet observed any other use, save that the blofsoms are of an agreeable scent, and the berries such a tempting bait for thrushes, that as long as they last, you shall he sure of their company. Some highly commend the juice of the berries, which, fermenting of itself, if well preserved, makes an excellent drink against the spleen and scurvy: Ale and beer brewed with these berries, being ripe, is an incomparable drink, familiar in Wales, where this tree is reputed so sacred, that there is not a churchyard without one of them planted in it, (as among us the Yew,) so, on a certain day in the year, every body religiously wears a crofs made of the wood; and the tree is by some authors called Fraxinus Cambro-Britannica; reputed to be a preservative against fascinations and evil spirits; whence, perhaps we call it Witchen, the boughs being stuck about the house, or the wood used for walking-staves.

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so straight as those raised from seeds. In former times this tree was supposed to be pofsefsed of the property of driving away witches and evil spirits; and this property is recorded in one of the stanzas of a very antient song, called, the LAIDLEY WORM of Spindleston Heughs:

> Their spells were vain. The hags returned
> To the queen in sorrowful mood,
> Crying, that witches have no power,
> Where there is Rown-tree wood.

The last line of this song leads to the true reading of a line in Shakspeare's Tragedy of Macbeth. The sailor's wife, on the witches requesting some chesnuts, hastily answers, "*A Rown-tree*, witch!" But all the editions have it, "*Aroint thee*, witch!" which is nonsense, and evidently a corruption.—*See a new edition of Macbeth, by Harry Rowe.*

This tree will grow upon almost any soil, either strong or light, moist or dry. It will flourish on mountains and in woods, and is never affected by the severity of weather, being extremely hardy. When loaded with fruit, it makes a most delightful appearance:

> Sanguineisque inculta rubent aviaria baccis. VIRG.

Of this species there is a cultivated Service, titled by Linnæus, *Sorbus foliis pinnatis, subtus villosis.* Caspar Bauhine calls it, *Sorbus sativa;* and Clusius, *Sorbus legitima.* It grows naturally in the south of France, in Italy, and in most of the southern countries of Europe, where its fruit is served up as a desert.

CHAP. XVII.

The HASEL[b].

1. NUX SILVESTRIS, or CORYLUS, the HASEL, is best raised from the nuts, (also by suckers and layers,) which you shall sow like mast, in a pretty deep furrow, toward the end of February, or treat them as you are instructed in the Walnut. Light ground may immediately be

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[b] There are only two species of this GENUS:

1. CORYLUS *(AVELLANA)* stipulis ovatis obtusis. Lin. Sp. Pl. 1417. *Hasel Nut with oval blunt stipulæ.* Corylus Sylvestris. C. B. P. 418 *WILD HASEL NUT.*

2. CORYLUS *(COLURNA)* stipulis linearibus acutis. Lin. Sp. Pl. 1417. *Hasel Nut with narrow acute stipulæ.* Corylus Byzantina. H. L. 191. *BYZANTINE NUT.*

The CORYLUS, in the Linnæan Syſtem, is of the claſs and order *Monoecia Polyandria.* The flowers begin to open about the twenty-fifth of January, and in a month's time are in full blow. They are small, and of a beautiful red colour. The catkins make their appearance about the middle of September.

The common Hasel grows wild in almost every part of this island, and serves very well for thickening woods. When allowed to grow, it will make poles of twenty feet, but it is usually cut down sooner for walking-sticks, fishing-rods, withs for fagotting, &c.; for which neceſsary purpoſes it is recommended as a profitable wood.

In order to raise a coppice of Hasels, the nuts must be gathered in the autumn. These must be carefully preserved till the month of February in a moist place, to keep them from growing dry: then, having the ground well ploughed and harrowed, let drills be drawn at one yard distance; into these drop the nuts at about ten inches distance, and let them be covered with two inches of earth. When the young plants appear, they must be kept clear from weeds in the manner formerly ordered for trees planted in rows, and they must remain under that careful cultivation till the weeds are no longer to be feared. Where the plants stand too thick, they should be properly thinned, and this thinning ought to be continued till the plants are left a yard asunder each way. A Coryletum may also be raised from plants drawn from the seminary, when they are a foot or two feet high. These should be planted where they are to remain at one yard asunder. In twelve years they may be cut down for poles; but they will be ready for a second fall much sooner; and afterwards may be cut every seventh or eighth year, when the value will be from ten to fifteen pounds per acre. The chief uses to which this wood is applied, is for hurdles, faggots, hoops, and bundles of stakes. Close hurdles sell from six shillings to nine shillings a dozen. Bundles of stakes sell for sevenpence each. Hoops are worth three

The Hazel Nut Tree

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J. Miller del.t & sc.

sown and harrowed in very accurately; but in case the mould be clay, plough it earlier, and let it be sufficiently mellowed with the frosts; and then the third year cut your trees near to the ground with a sharp bill, the moon decreasing. CH. XVII.

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shillings and sixpence a bundle of sixty hoops. The Byzantine Nut is distinguished from the other species chiefly by the stipulæ, which are very narrow and acute, whereas those of the common nut are oval and obtuse. It differs also in the size of its growth, the Byzantine seldom growing higher than four or five feet, hence it got the name of *Dwarf Nut-tree*. In other respects it is like our common Nut-tree; it flowers at the same time, and the fruit is produced in clusters. Mr. Miller suspects this and the Barcelona Nut to be the same.

The Filbert, or *Corylus sativa fructu oblongo*, is not a distinct species, but only a variety of the Common Nut. This can only be kept true to its kind by suckers, or layers, which last are observed to make the best trees. In order to form stools, some plants of the best kinds should be procured, and the twigs layered from them should be taken off and planted in the nursery. When well rooted, they may be removed into the ground where they are to remain. In some parts of Kent, plantations of Filberts are much attended to. The trees are never permitted to rise above six feet in height, and are regularly pruned and dished out like Gooseberry-bushes. They should stand at the distance of twelve feet, and when full spread the diameter of the cup formed by the branches should be about six feet. The intermediate spaces should be cultivated with beans, turnips, and hoeing crops; for upon the constant stirring of the ground the vigour of the trees principally depends. I am well informed that a bushel of nuts has been gathered from one tree managed in this manner. In a scarce year, Filberts in the husk are worth twenty-four shillings per bushel;—a great encouragement for plantations of this species. Hops are sometimes raised between the Filbert-trees, so that the expectations of the planter may be gratified with one and sometimes two crops.

It is an observation of great antiquity, and well confirmed, that "a good nut year makes a good wheat year." Virgil speaking of the Walnut-tree says,

Si superant fœtus, pariter frumenta sequentur. GEORG. i.

I have a peculiar pleasure in laying before the public the following letter, received from a gentleman much conversant in the management of Filbert-trees. "When the Filberts "raised from layers, are eight inches high, there will spring from them several small "branches. Those in the centre must be cut out, in order that the tree may be trained "in the form of a punch-bowl. The branches must not be permitted to exceed six feet "in height, and all kept of an equal length. The trees should be planted at the distance "of four yards from each other, and these, if well trained, will nearly touch in a few years. "It will be necessary to dig well about them every year, and every third year to give them "a good dressing of manure, as also to top the bearing branches early in the spring.— "Carefully remove all suckers and shoots about the roots. A tree thus trained, has been "known to produce two stone of nuts in the husk, and I am credibly informed, that "400l. has been made of the produce of one acre, sold at thirty shillings per "bushel, in the London market."

BOOK I.

2. But if you would make a grove for pleasure, plant them in foſſes, at a yard distance, and cut them within half a foot of the earth, dressing them for three or four springs and autumns, by only loosening the mould a little about their roots. Others there are who set the nuts by hand at one foot distance, to be transplanted the third year, at a yard asunder: But this work is not to be taken in hand so soon as the nuts fall, nor till winter be well advanced, because they are exceedingly obnoxious to the frosts; nor will they sprout till the spring; besides, vermine are great devourers of them. Preserve them therefore moist, not mouldy, by laying them in their own dry leaves, or in sand, till January.

Plantis eduræ Coryli nascuntur——— GEORG. ii.

Hasels from sets and suckers take.

3. From whence they thrive very well, the shoots being about the scantling of small wands and switches, or somewhat bigger, and such as have drawn divers hairy twigs, which are by no means to be disbranched, no more than their roots, unleſs by a very sparing and discreet hand. Thus your coryletum, or copse of Hasels, being planted about autumn, may, as some practise it, be cut within three or four inches of the ground the spring following, which the new cyon will suddenly repair in clusters, and tufts of fair poles of twenty, or sometimes thirty feet long: But I rather should spare them till two or three years after, when they shall have taken strong hold, and may be cut close to the very earth, the improsperous and feeble ones especially. Thus are Filberts likewise to be treated, both of them improved much by transplanting, but chiefly by graffing, and it should be tried with Filberts, and even with Almonds themselves, for more elegant experiments.

In the mean time, I do not confound the Filbert, Pontic, or Filbord, distinguished by its beard, with our foresters or bald Hasel-nuts, which doubtleſs we had from abroad, and bearing the names of Avelan, Avelin, as I find in some antient records and deeds in my custody, where my ancestors names were written Avelan, alias Evelin, generally.

4. For the place; they above all affect cold, barren, dry, and sandy grounds: mountains, and even rocky soils produce them; they prosper where quarries of freestone lie underneath, as at Haselbury in Wilts,

Haselingfield in Cambridgeshire, Haslemere in Surry, and other places; but more plentifully, if the ground be somewhat moist, dankish, and mosy, as in the fresher bottoms and sides of hills, hoults, and in hedge-rows. Such as are maintained for copses, may after twelve years be felled the first time; the next at seven or eight; for by this period their roots will be completely vigorous. You may plant them from October to January, provided you keep them carefully weeded till they have taken fast hold; and there is not among all our store a more profitable wood for copses, and therefore good husbands should store them with it.

5. The use of the Hasel is for poles, spars, hoops, forks, angling-rods, fagots, cudgels, coals, and springes to catch birds; and it made one of the best coals, once used for gunpowder, being very fine and light, till they found Alder to be more fit: There is no wood which purifies wine sooner than the chips of Hasel. It is good for withs and bands; upon which I remember, Pliny thinks it a pretty speculation, that a wood should be stronger to bind withal, being bruised and divided, than when whole and entire. The coals are used by painters to draw with, like those of Sallow: Lastly, for riding switches, and divinatory rods for the detecting and finding out of minerals; at least, if that tradition be no imposture. By whatsoever occult virtue the forked stick, so cut and skilfully held, becomes impregnated with those invisible steams and exhalations, as by its spontaneous bending from an horizontal posture, to discover not only mines and subterraneous treasure, and springs of water, but criminals guilty of murder, &c. made out so solemnly, by the attestation of magistrates, and divers other learned and credible persons, who have critically examined matters of fact, is certainly next to a miracle, and requires a strong faith[c]. Let the curious therefore con-

[c] It is certain that water and minerals may be discovered by an examination of the surface of the soil, but that a forked twig of Hasel should move when held over confined water, or a vein of mineral, is a thing not to be believed. It is an easy matter for a person, posesed of a delicate touch, to make the twig turn round at pleasure, without any *apparent* movement of the finger and thumb. I have often practised this in the presence of those who were in posesion of more faith than philosophy:

Thus he receives the most delight,
Who least perceives the juggler's slight. HUDIBRASS.

BOOK I.

ult that philosophical treatise of Dr. Vallemont *, which will at least entertain them with a world of suprising things. But the most signal honour it was ever employed in, and which might deservedly exalt this humble and common plant above all the trees of the wood, is that of hurdles, especially the flexible white, the red, and brittle; not for that it is generally used for the folding of our innocent sheep, an emblem of the church, but for making the walls of one of the first Christian Oratories in the world; and particularly in this island, that venerable and sacred fabrick at Glastonbury, founded by St. Joseph of Arimathea, which is storied to have been first composed but of a few small Hasel-rods interwoven about certain stakes driven into the ground;—and walls of this kind, instead of laths and punchions, super-induced with a coarse mortar, made of loam and straw, do to this day inclose divers humble cottages, sheds, and out-houses in the country. It is strong and lasting for such purposes, whole or cleft; and I have seen ample inclosures of courts and gardens so secured.

* Vallemont, Phisique Occult ou Traité de la Baguet Divinitoire, &c. But concerning the exploration & superstitious original, see Sir Thomas Browne's Vulgar Errors, c. xxiv. sec. xvii. and the commentators upon Hos. iv. 12.

6. There is a compendious expedient for the thickening of copses which are too transparent, by laying of a sampler, or pole, of an Hasel, Ash, Poplar, &c. of twenty or thirty feet in length, the head a little lopped into the ground, giving it a chop near the foot to make it succumb; this fastened to the earth with a hook or two, and covered with some fresh mould at a competent depth, (as gardeners lay their carnations,) will produce a world of suckers, and thicken and furnish a copse speedily. I add no more of Filberts, a kinder and better sort of Hasel-nut, of larger and longer shape and beard: the kernels also covered with a fine membrane, of which the red is more delicate: they both are propagated as the Hasel, and while more domestic, planted either asunder or in palisade, are seldom found in the copses. They are brought among other fruit to the best tables for desert, and are said to fatten; but, when too much eaten, are obnoxious to the asthmatic. In the mean time, of this I have had experience, that Hasel-nuts, but the Filbert especially, being full ripe and peeled in warm water, as they blanch Almonds, make a pudding very little, if at all, inferior to that our ladies make of Almonds.

The Birch Tree.

Publish'd Jan.y 1st 1776 by A. Hunter, M.D. as the Act directs. J.E. Miller del et Sc.

CHAP. XVIII.

The BIRCH[d].

CH. XVIII.

1. BETULA, the BIRCH, or BIRC, (whence some derive the name of Berkshire) in British Beduen, is doubtleſs a proper indigene of England, though Pliny calls it a Gaulish tree. It is altogether produced of roots or suckers, (tho' it sheds a kind of samera about the spring) which

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[d] Of this GENUS there are five species:

1. BETULA *(ALBA)* foliis ovatis acuminatis serratis. Lin. Sp. Pl. 1393. *Birch-tree with oval sawed leaves ending in points.* *THE COMMON BIRCH-TREE.*

The common Birch is a tree well known, and there are few moist places in this kingdom where it does not naturally grow. In summer its branches are cloathed with elegant small leaves, and in winter its trunk is covered with a whitish bark. These trees, therefore, may be planted in parks, lawns, &c. to increaſe the variety, as well as in woods, or coppices, to be cut for profit. The lopping of the Birch makes excellent fuel, as well as the best of brooms. The bark is of a very durable nature: the Swedes cover their houses with it, and it lasts many years. The inner fine bark was, before the invention of paper, used for writing; and of the sap is made a wholesome wine; salutary, it is said, for such as are afflicted with the stone and gravel.

2. BETULA *(NANA)* foliis orbiculatis crenatis. Lin. Sp. Pl. 1394. *Birch-tree with round crenated leaves.* Betula pumila foliis subrotundis. Amman. *DWARF BIRCH.*

This species is a native of Lapland, and is of signal use in the œconomy of the inhabitants of that arctic region: The branches furnish them with their chief fuel; and the seeds are the food of the Ptarmigan *(Tetrao Lagopus)* or white Partridge. These birds are much esteemed and make a considerable part of the sustenance of the inhabitants. Great quantities are caught in the winter season and sent to different provinces. Before Linnæus made his Lapland expedition, this Birch had been considered only as a variety of the common tree of that name; but its distinct specific characters have since been established. This tree has, within these few years, been added to the Flora Britannica, having been found by Mr. Lightfoot in the highlands of Scotland. It is of humble stature, seldom exceeding three or four feet. From this shrub is prepared a Moxa, which the Laplanders consider as an efficacious remedy in all painful diseases, when burnt upon the part.

3. BETULA *(LENTA)* foliis cordatis oblongis acuminatis serratis. Lin. Sp. Pl. 1394. *Birch-tree with oblong, pointed, heart-shaped, sawed leaves.* *THE CANADA BIRCH.*

This grows to a timber tree of sixty or more feet in height. The leaves are heart-shaped, oblong, smooth, of a thin consistence, pointed and very sharply serrated. The varieties of this species differ in colour, and go by the names of,—1. Dusky Canada Birch; 2. White

BOOK I. being planted at four or five feet interval, in small twigs, will suddenly rise to trees, provided they affect the ground, which cannot well be too barren or spungy; for it will thrive both in the dry and the wet, sand and stony, marshes and bogs; the water-galls, and uliginous parts of forests that hardly bear any grafs, do many times spontaneously produce it in abundance, whether the place be high or low, and nothing comes amiss to it. Plant the small twigs, or suckers having roots, and after the

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Paper Birch; 3. Poplar-leaved Canada Birch; 4. Low-growing Canada Birch. The liquor flowing from wounds made in this tree is used by the inhabitants of Kamptschatka without previous fermentation, in which state it is said to be pleasant and refreshing, but somewhat purgative. In this manner the crews of the RESOLUTION and DISCOVERY used it during their stay in the harbour of St. Peter and St. Paul. The natives of Kamptschatka convert the bark into domestic and kitchen purposes, and the wood is employed in the construction of sledges and canoes. Kraschininikoff, in his "History of Kamptschatka," says, that the natives convert the bark into a pleasant and wholesome food by stripping it off when it is green, and cutting it into long narrow stripes, like Vermicelli, drying it, and stewing it afterwards along with their Caviar.

4. BETULA *(NIGRA)* foliis rhombeo-ovatis acuminatis duplicato-serratis. Lin. Sp. Plant. 1394. *Birch-tree with rhomboid, oval, pointed leaves, which are doubly sawed.* Betula nigra Virginiana. Pluk. Alm. 67. *BLACK VIRGINIA BIRCH-TREE.*

This being of foreign growth, is propagated for wilderness and ornamental plantations; but as it begins now to become pretty common, it is to be hoped it will soon make a figure among our forest-trees, for it is equally hardy with our common Birch, and arrives at a much greater magnitude. This species will grow to upwards of sixty feet in height. The branches are spotted, and more sparingly set on the trees than the common sorts. The leaves are broader, grow on long foot-stalks, and add a dignity to the appearance of the tree. There are several varieties of this species, differing in the colour, size of the leaves, and shoots; all of which have names given them by nurserymen, who propagate the different sorts for sale; such as,—1. The Broad-leaved Virginian Birch; 2. The Poplar-leaved Birch; 3. The Paper Birch; 4. The Brown Birch, &c.

5. BETULA *(ALNUS)* Pedunculis ramosis. Lin. Sp. Pl. 1394. In the Flor. Lapponic. it is termed simply, *Alnus.* *THE COMMON ALDER.*

Linnæus has thought proper to class this tree with the Birch; but as Mr. Evelyn makes a separate chapter of it, I have in this place only mentioned its botanical description.

In the Linnæan System the BIRCH belongs to the class and order *Monoecia Tetrandria*, there being male and female flowers separately on the same plant, the male having four stamina. In general, the leaves are fully displayed by the beginning of April. The flowers appear in blow about the twenty-seventh of the same month, and about the eleventh of September the catkins are formed.

There are two good ways of propagating this tree, either by layers or seeds. If from seeds, they should be carefully gathered in the autumn, before they drop from their scales,

first year cut them within an inch of the surface; this will cause them to sprout in strong and lusty tufts, fit for copse and spring woods; or, by reducing them to one stem, render them, in a very few years, fit for the turner. CH. XVIII.

2. Though Birch be of all other the worst of timber, yet it has its various uses; as for the husbandman's ox-yoaks; also for hoops, small

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which will happen soon after they begin to open. These should be sown in the seminary, about a quarter of an inch deep; and, after they are come up, should be carefully cleansed from weeds for the first summer. The spring following they may be planted out in the nursery: The rows must be two feet and a half asunder, and the plants a foot and a half distant in the rows. There they may remain till they are of a sufficient size to be planted out for good.

Whoever has not the conveniency of procuring the seeds, may soon raise a great quantity by layers from very few stools. Having planted some stools for this purpose, and having headed them down to the ground, let them remain two years before they are layered. By this time each branch will have a great quantity of side-shoots, which being splashed and laid in the ground, every twig will grow, and make a fine plant, fit to be planted out in the nursery by the autumn following. These plants should be taken from the stools, and planted as the seedlings; and the stools ought to be refreshed with the knife, by taking off the old splashed wood, and preparing them to throw out vigorous fresh shoots for a second operation, which should be repeated every two years.

After the plants are of a size to be set out for good, they may be planted upon almost any ground with succefs; for the Birch, being a native of Britain, suits itself to all sorts of soils. It will thrive extremely well on barren land, whether it be wet or dry, sandy or stony, marshy or boggy. It sows itself, and will come up in places where hardly any other tree will grow. To what advantage then, may many parts of this island be planted with this tree, particularly such as have the advantage of large rivers, where the wood may be sent off by water; for where water-carriage may be had, the broom-maker will be a constant purchafer.

Whenever coppices of the Birch are planted, with a design to be sold to the broom-maker, the plants should be taken out of the nursery, or gathered in the woods, and set five feet asunder; and in eight years they will be ready to cut; when an acre, if it has succeeded well, will be worth about ten pounds. After this, the trees may be cut every six years, when the acre will be of the same value. If plantations of this tree are intended for hoops and smaller uses of husbandry, they will support a cutting for these purposes every twelfth year, and will be worth more than twelve pounds per acre. Thus may such lands as are not worth a shilling an acre be improved with Birch-trees; an improvement so much the greater, as the nature of the tree will admit of its being raised and planted out at a very small expence. When the land is good enough to admit of the plough, a crop of corn is the best preparation for a Birch plantation; but where this cannot be

BOOK I. screws, paniers, brooms, wands, bavin-bands, and withs for fagots; it claims a memory for arrows, bolts, shafts, our old English artillery; also for dishes, bowls, ladles, and other domestic utensils, in the good old days of more simplicity, yet of better and truer hospitality. With this tree, whereof they have a blacker kind, the Northern Americans make canoes, boxes, buckets, kettles, dishes, (which they sew and join very curiously with thread made of Cedar-roots) and divers other domestical

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done, the plants may be taken out of the nursery, when they are out of the reach of weeds, and then planted; and no farther care need be taken of them than keeping out cattle, till they are fit for cutting. The best season for planting out the Birch, if it be on dry ground, is autumn; but if it be in a wet soil, the spring is preferable.

So much for the cultivation of the common Birch; let us now give directions for the propagation of the foreign kinds. These may be raised from seeds and layers. We receive the seeds from America, where they are natives; when sown in beds of fine mould, and covered about a quarter of an inch deep, they will generally grow.

During the time the plants are in the seminary, they must be constantly weeded and watered in dry weather; and when they are one or two years old, according to their strength, they should be planted in the nursery, in rows in the usual manner. Weeding must always be observed in summer, and digging between the rows in winter; and when they are about a yard, or four feet high, they will be of a good size to be planted out for the wilderneſs quarters.

The propagation by layers, is the way to continue the varieties of the different sorts. A sufficient number of plants should be procured for this purpoſe, and set on a spot of double-dug ground, three yards distant from each other. The year following, if they have made no young shoots, they should be headed to within half a foot of the ground, to form the stools, which will then shoot vigorously the summer following; and in the autumn the young shoots should be splashed near the stools, and the tender twigs layered near their ends. They will then strike root, and become good plants by the autumn following; whilst fresh twigs will have sprung up from the stools, to be ready for the same operation. The layers, then, should be taken up, and the operation performed afresh.—If the plants designed for stools have made good shoots the first year, they need not be headed down, but splashed near the ground, and all the young twigs layered. Thus may an immediate crop be raised this way; whilst young shoots will spring out in great plenty below the splashed part, in order for layering the succeeding year. This work, therefore, may be repeated every autumn or winter; when some of the strongest layers may be planted out, if they are immediately wanted; whilst the others may be removed into the nursery, to grow to be stronger plants, before they are removed to their destined habitations.

Cuttings also, if set in a moist shady border the beginning of October, will frequently grow: But as this is not a sure method, and as these trees are so easily propagated by layers, it hardly deserves to be put in practice.

utensils, as baskets, bags, &c.; and of a certain fungous excrescence from the bole, after being boiled, beaten, and dried in an oven, they make excellent spunck or touchwood, and balls to play withal; it is astringent, and, being reduced to powder, is an infallible remedy in the hæmorrhoides. They make also not only this small ware, but even small craft, pinnaces, of Birch: Ribbing them with white Cedar, and covering them with large flakes of Birch-bark, they sew them with thread of Spruse-

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In Sweden the budding and leafing of the Birch-tree is considered as a directory for sowing barley; and as there is something extremely sublime and harmonious in the idea, I flatter myself an account of it will be acceptable.

Mr. Harold Barck, in his ingenious diſsertation upon the foliation of trees, published in the Amæn. Acad. vol. iii. informs us, that the illustrious Linnæus had, in the most earnest manner, exhorted his countrymen to observe, with all care and diligence, at what time each tree expands its buds and unfolds its leaves; imagining, and not without reason, that his country would, some time or other, reap some new and perhaps unexpected benefit from observations of this kind made in different places.

As one of the apparent advantages, he advises the prudent husbandman to watch, with the greatest care, the proper time for sowing; because this, with the Divine aſsistance, produces plenty of provision, and lays the foundation of the public welfare of the state, and of the private happineſs of the people. The ignorant farmer, tenacious of the ways and customs of his ancestors, fixes his sowing season to a month, and sometimes to a particular week, without considering whether the earth be in a proper state to receive the seed; from whence it frequently happens, that what the sower sowed with sweat, the the reaper reaps with sorrow. The wise œconomist should therefore endeavour to fix upon certain signs whereby to judge of the proper time for sowing. We see trees open their buds and expand their leaves, from whence we conclude that spring approaches, and experience supports us in the conclusion; but no body has as yet been able to show us what trees Providence has intended should be our kalendar, so that we might know on what day the countryman ought to sow his grain. No one can deny but that the same power which brings forth the leaves of trees, will also make the grain vegetate; nor can any one aſsert that a premature sowing will always, and in every place, accelerate a ripe harvest. Perhaps therefore we cannot promise ourselves a happy succeſs by any means so likely, as by taking our rule for sowing, from the leafing of trees. We must for that end observe in what order every tree puts forth its leaves according to its species, the heat of the atmosphere, and the quality of the soil. Afterwards, by comparing together the observations of the several years, it will not be difficult to determine, from the foliation of the trees, if not certainly, at least probably, the time when annual plants ought to be sown. It will be neceſsary likewise to remark what sowings made in different parts of the spring produce the best crops, in order that, by comparing these with the leafing of trees, it may appear which is the most proper time for sowing.

To these most ingenious remarks, Mr. Barck has added the order of the leafing of trees in Sweden. Mr. Stillingfleet is the only person that has made correct observations upon

BOOK I.

roots, and pitch them, as it seems we did even here in Britain, as well as the Veneti, making use of the Willow: Whereof Lucan,

> Primum cana salix madefacto vimine parvam
> Texitur in puppim, cæsoque induta juvenco,
> Vectoris patiens, tumidum superemicat amnem.
> Sic Venetus, stagnante Pado, fusoque Britannus
> Navigat Oceano.———————————

> When Sicoris to his own banks restor'd,
> Had quit the field, of twigs and willow-board
> They build small craft, cover'd with bullocks' hide,
> In which they reach'd the river's farther side:
> So sail the Veneti, if Padus flow;
> The Britains sail on their rough ocean so.

It also makes good fuel. In many of the mosses in the West-Riding of Yorkshire, are often dug up Birch-trees that burn and flame like Fir and Candle-wood; and I think Pliny says, the Gauls extracted a sort of bitumen out of Birch. Great and small Coal are made by the charing of this

See Philosoph. Trans. vol. ix. No. cv. p. 93.

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the foliation of the trees and shrubs of this kingdom. The following is his kalendar, which was made in Norfolk in the year 1765.

1 Honey-suckle - Jan. 15	13 Filbert - - - April 7	25 Chesnut - - April 16
2 Gooseberry - March 11	14 Sallow - - - - - 7	26 Willow - - - - 17
3 Currant - - - - 11	15 Alder - - - - - 7	27 Oak - - - - - - 18
4 Elder - - - - - 11	16 Sycamore - - - - 9	28 Lime - - - - - 18
5 Birch - - - April 1	17 Elm - - - - - 10	29 Maple - - - - - 19
6 Weeping Willow - 1	18 Quince - - - - 10	30 Walnut - - - - 21
7 Raspberry - - - 3	19 Marsh Elder - - 11	31 Plane - - - - - 21
8 Bramble - - - - 3	20 Wych Elm - - - 12	32 Black Poplar - - 21
9 Brier - - - - - 4	21 Quicken-tree - - 13	33 Beech - - - - - 21
10 Plum - - - - - 6	22 Hornbeam - - - 13	34 Acacia Robinia - - 21
11 Apricot - - - - 6	23 Apple-tree - - - 14	35 Ash - - - - - - 22
12 Peach - - - - - 6	24 Abele - - - - - 16	36 Carolina Poplar - - 22

In different years and in different soils and expositions, these trees and shrubs vary as to their leafing; but they are invariable as to their succefsion, being bound down to it by Nature herself. A farmer, therefore, who would use this sublime idea of Linnæus, should diligently mark the time of budding, leafing, and flowering of different plants. He should also put down the days on which his respective grains were sown; and, by comparing these two tables for a number of years, he will be enabled to form an exact kalendar for his spring corn. An attention to the discolouring and falling of the leaves of plants, will

wood, (see Book iii. chap. iv. of Fuel,) as of the tops and loppings, Mr. Howard's new Tan. The inner white cuticle, and silken bark, (which strips off of itself almost yearly,) was antiently used for writing-tables, before the invention of paper; there is a Birch-tree in Canada, whose bark will serve to write on, and may be made into books, and of the twigs very pretty baskets; with the outward thicker and coarser part of the common Birch, are divers houses in Ruſsia, Poland, and those poor northern tracts, covered, instead of slates and tile: nay, one who has lately published an account of Sweden, says, that the poor people grind the very bark of Birch-trees to mingle with their bread-corn. It is affirmed by Cardan, that some Birch-roots are so very extravagantly veined, as to represent the shapes and images of beasts, birds, trees, and many other pretty resemblances. Lastly, of the whitest part of the old wood, found commonly in doating Birches, is made the grounds of our effeminate farined Gallants' sweet powder; and of the quite consumed and rotten, (such as we find reduced to a kind of reddish earth in super-

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aſsist him in sowing his winter grain, and teach him how to gueſs at the approach of winter. Towards the end of September, which is the best season for sowing wheat, he will find

The leaves of the Plane-tree, tawny;
——— of the Oak, yellowish green;
——— of the Hasel, yellow;
——— of the Sycamore, dirty brown;
——— of the Maple, pale yellow;
——— of the Ash, fine lemon;
The leaves of the Elm, orange;
——— of the Hawthorn, tawny yellow;
——— of the Cherry, red;
——— of the Hornbeam, bright yellow.

There is a certain kind of genial warmth which the earth should enjoy at the time the seed is sown. In the animal world we observe this in the most convincing manner. In brutes the symptoms of that period are plainly marked. The budding, leafing, and flowering of plants seem to indicate the same happy temperature of the earth.—

"Vere tument terræ, et genitalia semina poscunt."

Appearances of this sublime nature may be compared to the writing upon the wall, which was seen by many, but understood by few. They seem to constitute a kind of harmonious intercourse between God and man. They are the silent language of the Deity.

The ingenious and indefatigable Mr. Young has endeavoured to ascertain the time of sowing by another method. His experiments are accurately conducted, and his conclusions from them fairly drawn; but it were to be wished that he had interwoven the idea of Linnæus with his own experiments; we should then have had an unerring rule to go by. The temperature of the season, with respect to heat and cold, drought, and wet, differs in every year. Experiments made this year cannot determine, with certainty, for the next. They may aſsist, but cannot be conclusive. The hints of Linnæus constitute an universal rule for the whole world, because trees, shrubs, and herbs, bud, leaf, flower, and shed their leaves, in every country, according to the difference of seasons.

BOOK I. annuated hollow trees,) is gotten the best mould for the raising of divers seedlings of the rarest plants and flowers; to say nothing here of the Magisterial Fasces, for which, antiently, the cudgels were used by the Lictor, as now the gentler rods by our tyrannical Pedagogues, for lighter faults.

3. I should here add the uses of the water too, had I full permiſsion to tamper with all the medicinal virtues of trees; but if the sovereign effects of the juice of this despicable tree supply its other defects, (which make some judge it unworthy to be brought into the catalogue of woods to be propagated,) I may perhaps, for once, be permitted to play the empiric, and to gratify our laborious woodman with a draught of his own liquor; and the rather, because these kind of secrets are not yet sufficiently cultivated; and ingenious planters should by all means be encouraged to make more trials of this nature, as the Indians and other nations have done on their Palms and trees of several kinds, to their great emolument. The mystery is no more than this: About the beginning of March, (when the buds begin to be proud and turgid, and before they expand into leaves,) with a chisel and a mallet, cut a slit almost as deep as the very pith, under some bough or branch of a well-spreading Birch; cut it oblique, and not long-ways, (as a good surgeon would make his orifice in a vein,) inserting a small stone or chip, to keep the lips of the wound a little open. Sir Hugh Platt, (giving a general rule for the gathering of sap and tapping of trees,) would have it done within one foot of the ground, the first rind taken off, and then the white bark slit over-thwart, no farther than to the body of the tree: Moreover, that this wound be made only in that part of the bark which respects the south, west, or between those quarters; because, says he, little or no sap riseth from the northern, nor indeed when the east wind blows. In this slit, by the help of your knife to open it, he directs that a leaf of the tree be inserted, first fitted to the dimensions of the slit, from which the sap will distil in manner of filtration. Take away the leaf, and the bark will close again, a little earth being clapped to the slit. Thus the Knight, for any tree. We have already shown how the Birch is to be treated: Fasten therefore a bottle, or some such convenient veſsel appendant; this does the effect as well as Perforation, or Tapping: Out of this aperture will extil a limpid and clear water, retaining an obscure smack both of the taste and odour of the tree; which (as I am credibly informed) will, in the space of

twelve or fourteen days, preponderate and outweigh the whole tree itself, body and roots; which if it be constant, and so happen likewise in other trees, is not only stupendous, but an experiment worthy the consideration of our profoundest philosophers: *An ex sola aqua fiunt arbores?* Whether water only be the principle of vegetables, and consequently of trees. I say, I am credibly informed; and therefore the late unhappy angry man * might have spared his animadversion: For he that said but twenty gallons run, does he know how many more might have been gotten out of larger apertures, at the insertion of every branch and foot in the principal roots during the whole season! But I conceive I have good authority for my assertion, out of the author cited in the margin †, whose words are these: *Si mense Martio perforaveris* Betulam *exstillabit aqua limpida, clara et pura, obscurum arboris saporem et odorem referens, quæ, spacio xii aut xiv dierum, præponderabit arbori cum ramis et radicibus* [e]. His exceptions about the beginning of March are very insignificant, since I undertake not punctuality of time; and his own pretended experience showed him, that in hard weather it did not run till the expiration of the month, or beginning of April, and another time on the tenth of February; and usually, he says, about the twenty-fourth day, &c. at such uncertainty: What immane difference then is there between the twenty-fourth of February and the commencement of March? Besides, these anomalous bleedings, even of the same tree, happen early or later, according to the temper of the air and weather. In the mean time, evident it is, that we know of no tree which does more copiously attract, be it that so much celebrated spirit of the world, as they call it, in form of water, (as some) or a certain specific liquor richly impregnated with this balsamical property: That there is such a magnes in this simple tree, as does manifestly draw to itself some occult and wonderful virtue, is notorious; nor is it conceivable, indeed, the difference between the efficacy of that liquor which distils from the bole, or parts of the tree nearer to the root, (where Sir Hugh would celebrate the incision,) and that which weeps out from the more sublime branches, more impregnated with this astral virtue, as

* Dr. Stubbs.

† Aditus novus ad Occultas Sympathiæ et Antipathiæ causas inveniendas, &c. a Silvestro Rattray, M. D. Glasguensi, 1658, p. 55.

[e] Dr. Rush of Philadelphia, in his account of the Sugar-Maple, informs us, that in the course of twenty-four hours, (April 14, 1798,) there flowed from a single tree of the Sugar-Maple, that had been tapped for several successive years, near twenty-three gallons of sap; but he says, that such instances are rare, the usual quantity being about five gallons in promising weather, for several days together.

BOOK I. not so near the root, which seems to attract rather a cruder and more common water, through fewer strainers, and neither so pure and aërial as in those refined percolations, the nature of the places where these trees delight to grow (for the most part lofty, dry, and barren) considered. But I refer these disquisitions to the Learned; especially, as mentioned by that incomparable Philosopher, and my most noble friend, the Honourable Mr. Boyle, in his Second Part of the Usefulnefs of Natural Philosophy, Efsay iv. where he speaks of the Manna del Corpo, or Trunk-manna, as well as of that liquor from the bough; also of the Sura, which the Cocoa-trees afford; and that Polonian secret of the liquor of the Walnut-tree root; with an encouragement of more frequent experiments, to educe saccharine substances upon these occasions: But the book being published so long since this Discourse was first printed, I take only here the liberty to refer the reader to one of the best Entertainments in the world.

But now, before we expatiate farther concerning saps, it is by some controverted, whether this exhaustion would not be an extreme detriment to the growth, substance, and other parts of trees. As to the growth and bulk, if what I have observed of a Birch, which has for very many years been perforated at the usual season, besides the scars made in the bark, it still thrives, and is grown to a prodigious substance, the species considered. What it would effect in other trees, the Vine excepted when unseasonably lanced, I know not.

4. Whilst the second edition was under my hand, there came to me divers papers upon this subject, experimentally made by a worthy friend of mine, a learned and most industrious person, which I had here once resolved to have published, according to the generous liberty granted me for so doing; but understanding he was still in pursuit of that useful and curious secret, I changed my resolution into an earnest addrefs, that he would communicate it to the world himself, together with those other excellent inquiries and observations, which he is adorning for the benefit of planters, and such as delight themselves in those innocent rusticities. I will only, by way of corollary, hint some particulars for the satisfaction of the curious; and especially that we may in some sort gratify those earnest suggestions and queries of the late most-obliging publisher * of the Philosophical Transactions, to whose indefatigable pains the learned

* Mr. Oldenburg.

world has been infinitely engaged. In compliance therefore to his queries, CH. XVIII.
Monday, October 19, 1668, No. xl. p. 797, 801, &c. these generals are submitted: That in such trials, as my friend esayed, he has not yet encountered with any sap but what is very clear and sweet, especially that of the Sycamore, which has a dulcoration as if mixed with sugar, and that it runs one of the earliest: That the Maple distilled when quite rescinded from the body, and even whilst he yet held it in his hand: That the Sycamore ran at the root, which some days before yielded no sap from the branches; the experiment made at the end of March. But the accurate knowledge of the nature of sap, and its periodic motions and properties in several trees, should be observed by some at entire leisure to attend it daily, and almost continually, and will require more than any one person's industry can afford; for it must be inquired concerning every tree, its age, soil, situation, &c. the variety of its ascending sap depending on it; and then of its sap ascending in the branches and roots; descending in cut branches; ascending from root, and not from branches; the seasons and difference of time in which those accidents happen, &c. He likewise thinks the best expedient to procure store of liquor, is to pierce the trees almost quite through all the circles, on both sides the pith, leaving only the outmost circle, and the barks on the north or north-east side unpierced; and this hole, the larger it is bored, the more plentifully it will distil; which if it be under and through a large arm near the ground, it is effected with greatest advantage, and will need neither stone nor chip to keep it open, nor spigot to direct it to the recipient. Thus it will, in a short time, afford liquor sufficient to brew with; and in some of these sweet saps, one bushel of malt will afford as good ale as four in ordinary waters, even in March itself; in others, as good as two bushels; for this, preferring the Sycamore before any other: But to preserve it in best condition for brewing, till you are stored with a sufficient quantity, it is advised, that what first runs be insolated, and placed in the sun, till the remainder be prepared, to prevent its growing sour; but it may also be fermented alone, by such as have the secret. To the curious these esays are recommended: That it be immediately stopped up in the bottles in which it is gathered, the corks well waxed, and exposed to the sun, till, as was said, a sufficient quantity be run; then let so much rye-bread (toasted very dry, but not burnt) be put into it, as will serve to set it a working; and when it begins to ferment, take it out, and bottle it immediately. If you had a few cloves, &c. to steep in it, it will cer-

tainly keep the year about: It is a wonder how speedily it extracts the taste and tincture of the spice. Mr. Boyle proposes a sulphureous fume to the bottles: Spirit of wine may haply not only preserve, but advance the virtues of saps; and infusions of raisins are obvious, and without decoction best, which does but spend the more delicate parts. Note, that the sap of the Birch will make excellent mead.

5. To these observations, that of the weight and virtue of the several juices, would be both useful and curious: As, whether that which proceeds from the bark, or between that and the wood, be of the same nature with that which is supposed to spring from the pores of the woody circles? And whether it rise in like quantity, upon comparing the incisures? All which may be tried, first attempting through the bark, and saving that apart, and then perforating into the wood, to the thickneſs of the bark, or more, with a like separation of what distils. The period also of its current should be calculated; as how much proceeds from the bark in one hour; how much from the wood or body of the tree; and thus every hour, with a still deeper incision with a good large auger, till the tree be quite perforated; then by making a second hole within the first, fitted with a leſser pipe, the interior heart-sap may be drawn apart, and examined by weight, quantity, colour, distillation, &c. and if no difference perceptible be detected, the presumption will be greater, that the difference of heart and sap in timber, is not from the sap's plenty or penury, but the season; and then poſsibly the very season of squaring as well as felling of timber, may be considerable to the preservation of it.

6. The notice likewise of the sap's rising more plentifully and constantly in the sun than shade, more in the day than night, more in the roots than branches, more southward, and when that and the west wind blows, than northward, &c. may yield many useful observations: As for planting, to set thicker or thinner, (*si cætera sint paria*, namely, the nature of the tree, soil, &c.) and not to shade overmuch the roots of those trees whose stems we desire should mount, &c. That in transplanting trees we turn the best and largest roots towards the south, and consequently the most ample and spreading part of the head corresponding to the roots: For if there be a strong root on that quarter, and but a feeble attraction in the branches, this may not always counterpoise the weak roots on the north-side, damnified by the too puiſsant attraction of over-large branches: This may also

suggest a cause why trees flourish more on the south-side, and have their integument and coats thicker on those aspects *annually*, with divers other useful speculations, if in the mean time they seem not rather to be punctilios over nice for a plain forester. Let the curious further consult the Philosophical Transactions, No. xliii. xliv, xlvi, xlviii, lvii, lviii, lxviii, lxx, lxxi. for farther instances and trials upon this subject of sap; also that excellent treatise of Hen. Meibomius, *De Cerevisiis Potibusque et Ebriaminibus extra Vinum*, annexed to *Turnebus de Vino, &c.* where he shows how, and by whom, after the first use of water and milk, were introduced the drinks made from vegetables, vines, corn, fruits, and juices tapped out of trees.

7. To show our reader yet, that these are no novel experiments, we are to know, that a large tract of the world almost altogether subsists on these *Treen* liquors, especially that of the Date, which being grown to about seven or eight feet in height, they wound, as we have taught, for the sap, which they call *Toddy*, a very famous drink in the East Indies. This tree increasing every year about a foot, near the opposite part of the first incisure, they pierce again, changing the receiver; and so still, by opposite wounds and notches, they yearly draw forth the liquor, till it arrive to near thirty feet upward, and of these they have ample groves and plantations, which they set at seven or eight feet distance; but then they use to percolate what they extract through a stratum made of the rind of the tree, well contused and beaten, before which preparation it is not safe to drink it; and it is observed that some trees afford a much more generous wine than others of the same kind. In the Cocoa and Palmeto trees, they chop a bough, as we do the Betula; but in the Date [r], make

[r] Mr. Evelyn seems to have been misinformed in the manner of procuring the juice from the Date-tree. Dr. Shaw, in his "Observations on several parts of Barbary and the Levant," describes the operation in the following manner: This *(meaning the juice)* they procure by cutting off the head or crown of the more vigorous plants, and scooping the top of the trunk into the shape of a bason; where the sap, in ascending, lodges itself at the rate of three or four quarts a day, during the first week or fortnight; after which the quantity daily diminishes, and at the end of six weeks, or two months, the juices are entirely consumed; the tree then becomes dry, and serves only for timber or fire-wood. This liquor, which has a more luscious sweetnefs than honey, is of the consistence of a thin syrup, but quickly grows tart and ropy, acquiring an intoxicating quality, and giving upon distillation an agreeable spirit of *aráky*, according to the general names of these people for all hot liquors extracted by the *Alembeck*. P. 142.

BOOK I.

the incision with a chisel in the body very neatly, in which they stick a leaf of the tree, as a lingula to direct it into the appendant veſsel.

8. The liquor of the Birch is esteemed to have all the virtues of the spirit of salt, without the danger of its acrimony; most powerful for the diſsolving of the stone in the bladder, bloody water, and strangury: Helmont shows how to make a beer of the water; but the wine is a most rich cordial, curing, as I am told, consumptions, and such interior diseases as accompany the stone in the bladder or reins. The juice decocted with honey and wine, Dr. Needham affirms he has often cured the scorbut with. This wine, equisitely made, is so strong that the common sort of stone bottles cannot preserve the spirits, so subtle they are and volatile; and yet it is gentle, and very harmleſs in operations within the body, and exceedingly sharpens the appetite, being drunk *ante pastum:* I will present you with a receipt, as it was sent me by a fair Lady, which I have often, and still make use of.

De Lithiasi. c. viii. n. 24, 25, &c.

To every gallon of Birch-water put a quart of honey, well stirred together; then boil it almost an hour with a few cloves and a little lemon peel, keeping it well scummed; when it is sufficiently boiled, and become cold, add to it three or four spoonfuls of good ale to make it work, which it will do like new ale; and when the yeast begins to settle, bottle it up as you do other winy liquors. It will, in a competent time, become a most brisk and spirituous drink, which, besides the former virtues, is a very powerful opener, doing wonders for cure of the phthisic: This wine may, if you please, be made as succeſsfully with sugar, instead of honey, one pound to each gallon of water; or you may dulcify it with raisins, and compose a raisin-wine of it. I know not whether the quantity of the sweet ingredients might not be somewhat reduced, and the operation improved: But I give it as received. The author of the Vinetum Brit. boils it but a quarter, or half an hour, then setting it a cooling, adds a very little yeast to ferment and purge it; and so barrels it with a small proportion of cinnamon and mace bruised, about half an ounce of both to ten gallons, close stopped, and to be bottled a month after. Care must be taken to set the bottles in a very cool place, to preserve them from flying; and the wine is rather for present drinking than of long duration, unleſs the refrigeratory be extraordinarily cold. The very smell of the firsts pringing leaves of this tree wonderfully recreates and exhilarates the spirits.

9. But besides these, Beech, Alder, Ash, Sycamore, Elder, &c. should be attempted for liquors: Thus Crabs, even our very Brambles, may posibly yield us medical and useful wines. The Poplar was heretofore esteemed more physical than the Birch. The sap of the Oak, juice or decoction of the inner bark, cures the farcy, a virulent and dangerous infirmity in horses, and which, like the cancer, is reputed incurable by any other topic than some actual or potential cautery. But what is more noble a dear friend of mind asured me, that a country neighbour of his, at least fourscore years of age, who had lain sick of a bloody strangury, (which by cruel torments reduced him to the very article of death,) was, under God, recovered to perfect and almost miraculous health and strength, so as to be able to fall stoutly to his labour, by one sole draught of beer, wherein was the decoction of the internal bark of the Oak-tree [g]; and I have seen a composition of an admirable sudorific and diuretic for all affections of the liver, out of the like of the Elm, which might yet be drunk daily as our Coffee is, and with no lefs delight: But quacking is not my trade; I speak only here as a plain husbandman and a simple forester; out of the limits whereof, I hope, I have not unpardonably transgrefsed. Pan was a Physician, and he, you know, was President of the woods. But I proceed to the Alder.

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[g] This decoction is very proper in the complaint mentioned, when there is reason to suspect the cause to be a difsolved state of the blood, which is often the case; but when the bloody urine proceeds from the irritation of a stone in the kidneys or bladder, this remedy will rather aggravate than mitigate the disease.

CHAP. XIX.

The ALDER[h].

1. ALNUS, the ALDER, is of all other the most faithful lover of watery and boggy places, and those most despised weeping parts, or water-galls of forests;—*craſsisque paludibus Alni;* for, in better and drier ground they attract the moisture from it, and injure it. They are propa-

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[h] According to the system of the celebrated Linnæus, this tree is claſsed with the Birch, under the title of BETULA *(ALNUS)* pedunculis ramosis. *THE COMMON ALDER.*

This tree belongs to the claſs and order *Monoecia Tetrandria*, there being male and female flowers separately on the same plant, the male having four stamina. The catkins are formed about the sixteenth of September, and the flowers are in full blow about the twenty-sixth of March. The leaves begin to open about the seventh of April.

The ALDER is generally planted for coppice-wood, to be cut down every ninth or tenth year for poles. These coppices are raised either from truncheons or young trees, the latter of which is greatly preferable. In order to obtain a quantity of trees for this purpose, some suckers should be taken out of the meadows where the Alder-trees grow. These should be planted on a prepared piece of ground, and afterwards headed down for stools. By the succeeding autumn they will have shot out many young branches, which may be laid in the ground; and by that time twelvemonth they will have taken root, when they should be removed from the stools, and planted in rows, to acquire a sufficient height to be above the weeds, when planted in the places where they are to remain. In one or two years they will be strong enough to be planted out for good. If the coppice is to stand upon boggy or watery ground, they may be removed from the nursery, and planted three feet asunder, the holes having been previously prepared to receive them. Here they may stand for six or seven years; when every other tree should be taken away, and the rest cut down for stools. The stools will then be six feet asunder; and as each stool will throw out many young branches for poles, they ought not to stand at a nearer distance. Every ninth or tenth year will afford a fall of these trees for poles; and in performing this operation, they should be taken off smooth and fine, so that the stool may not be damaged, or hindered from producing a fresh crop.

The other leſs eligible method, though perhaps least expensive, is performed by planting truncheons three feet long. Two of the feet must be thrust into the ground, having first widened a hole with a crow, or some such instrument, to preſerve the bark from being rubbed off in planting. These should be set at the distance of one yard. But, at the time of the first fall, the planter must not expect to remove every other tree, for many of the truncheons will not grow; neither have I ever seen a coppice, raised in this way, so luxuriant and beautiful as when raised from regular plants.

The Alder Tree.

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J. S. Miller del. et Sc.

gated of truncheons, and will come of seeds (for so they raise them in Flanders, and make wonderful profit of the plantations) like the Poplar; or of roots (which I prefer) being set as big as the small of one's leg, and in length about two feet, whereof one should be plunged in the mud. This profound fixing of aquatic trees is recommended to preserve them steady, and safe from the concuſsions of the winds and violence of

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After the truncheons are planted, the weeds should be kept down till the plants are shot out of their reach; and after every fall, in the following winter, the stools ought to be looked over, and all the weak side-branches taken off. This will strengthen thoſe which are already the strongest, and will enable them to shoot up more vigorously for poles.

Alders planted by the sides of rivers, brooks, &c. may be cut every eight or ten years, which will produce good profit, as well as keep the river in its proper channel.

The Alder-tree will grow to the height of about thirty-five or forty feet, and its timber is very valuable for works intended to lie constantly under water, where it will harden, and last for ages. It is said to have been used under the Rialto at Venice; and we are told by Vitruvius, that the moraſses about Ravenna were piled with this timber, in order to lay the foundation for building upon.

This tree admits of some varieties which are sought after for curious collections; such as,—1. The long-leaved American Alder; 2. The White Alder; 3. The Black Alder; 4. The Hoary-leaved Alder; 5. The Dwarf Alder. This last grows upon bogs, and is with difficulty preserved in gardens, unleſs the soil be naturally moist and wet. The others have names aſsigned them from the different colours of the leaves and bark, except the first sort, which receives its title from the length of its leaves. This beautiful variety grows to about thirty feet in height, and merits a place in the choicest collections. It may be propagated by layers or cuttings. The branches are slender, smooth, numerous, and of a dark-brown or purple colour. The leaves are long, and free from that clammy, or glutinous matter, which is peculiar to those of the common Alder. They are smooth, oval, spear-shaped, and indented, which gives the tree an air of freedom in its luxuriant state. I have seen the leaves as late as December, at which time the tree has the appearance of an evergreen.

From the experience of ages, the Alder is found to resist all impreſsions made upon it by water, which single consideration ought to induce us to increase our plantations of this tree. In Flanders, and in Holland, it is raised in abundance for the purpose of making piles for the support of buildings erected in moiſt and boggy places. "Alnus autem, quæ proxime fluminum ripis procreatur, et minime materies utilis videtur, habet in se egregias rationes: etenim ——— in palustribus locis infra fundamenta ædificiorum, palationibus crebre fixa, recipiens in se quod minus habet in corpore liquoris, permanet immortalis ad æternitatem, et sustinet immania pondera structuræ, et sine vitiis conservat."—Vitruv. lib. ii.

The Alder produces a kind of cone which contains the seed. In some places abroad, this tree is raised from seed, and I am told that Mr. Stephens, of Camerton, near Bath, raises them in that manner with great succeſs.

BOOK I. waters, in their liquid and slippery foundations. They may be placed at four or five feet distance, and when they have struck root, you may cut them, which will cause them to spring in clumps, and to shoot out into many useful poles. But if you plant smaller sets, cut them not till they are arrived to some competent bigneſs, and that in a proper season, which is, for all the aquatics and soft woods, not till winter be well advanced, in regard of their pithy substance: Therefore, such as you shall have occasion to make use of before that period, ought to be well grown, and felled with the earliest, and in the first quarter of the increasing moon, that so the succeſsive shoot receive no prejudice. Some; before they fell, disbark their Alders and other trees; of which see book iii. chap. iii. But there is yet another way of planting Alders after the Jersey manner, which I received from a most ingenious Gentleman of that country; and that is, by taking truncheons of two or three feet long, at the beginning of winter, and to bind them in fagots, and place the ends of them in water, till towards the spring, by which season they will have contracted a swelling spire, or knur, about that part, which being set, does (like the Gennet-moil apple-tree) never fail of growing and striking root. There is a black sort more affected to woods and drier grounds, and bears a black berry, not so frequently found; yet growing, somewhere about Hampstead, as the learned Dr. Tancred Robinson obſerves.

2. There are a sort of husbands who take exceſsive pains in stubbing up their Alders, wherever they meet them in the boggy places of their grounds, with the same indignation as one would extirpate the most pernicious of weeds; and when they have finished, know not how to convert their best lands to more profit than this (seeming despicable) plant might lead them to, were it rightly understood: Besides, the shadow of this tree does feed and nourish the very graſs which grows under it; and, being set and well plashed, is an excellent defence to the banks of rivers; so as I wonder it is not more practised about the Thames, to fortify and prevent the mouldering of the walls from the violent weather they are exposed to.

3. You may cut Aquatic Trees every third or fourth year, and some more frequently, as I shall show you hereafter. They should also be abated within half a foot of the principal head, to prevent the perish-

ing of the main stock, and besides to accelerate their sprouting. In setting the truncheons, it were not amiſs to prepare them a little after they are fitted to the size, by laying them a while in water; this is also practicable in Willows, &c. CH. XIX.

4. Of old they made boats of the greater parts of this tree, and, excepting Noah's Ark, the first veſsels we read of were made of this material.

Tunc alnos primùm fluvii sensêre cavatas. GEORG. i.

When hollow Alders first the waters try'd.

Nec non et torrentem undam levis innatat alnus
Miſsa Pado;——— GEORG. ii.

And down the rapid Po light Alders glide.

And as then, so now, are over-grown Alders frequently sought after for such buildings as lie continually under water, where it will harden like a very stone; whereas, being kept in any unconstant temper, it rots immediately, because its natural humidity is of so near affinity with its adventitious, as Scaliger aſsigns the cause. Vitruvius tells us, that the moraſses about Ravenna in Italy were piled with this timber to superstruct upon, and highly commends it. I find also they used it under that famous bridge at Venice, the Rialto, which paſses over the Grand Canal, bearing a vast weight. Joan. Bauhinus pretends, that in tract of time it turns to stone; which perhaps it may seem to be, as well as other aquatics, where it meets with some lapidescent quality in the earth and water.

5. The poles of Alder are as useful as those of Willows; but the coals far exceed them, especially for gun-powder. The wood is likewise useful for piles, pumps, hop-poles, water-pipes, troughs, sluices, small trays and trenchers, wooden-heels; the bark is precious to dyers, and some tanners and leather-dreſsers make use of it; and with it and the fruit, instead of gall, they compose an ink. The fresh leaves alone applied to the naked sole of the foot, infinitely refresh the surbated traveller. The bark macerated in water, with a little rust of iron, makes a black dye, which may also be used for ink: The interior rind of the Black

BOOK I. Alder purges all hydropic and serous humours; but it must be dried in the shade, and not used green, and the decoction suffered to settle two or three days before it be drunk.

Being beaten with vinegar, it heals the itch certainly: As to other uses, the swelling bunches which are now and then found in the old trees, afford the inlayer pieces curiously chambleted, and very hard; but the fagots are better for the fire than for the draining of grounds, by placing them (as the guise is) in the trenches; which old rubbish of flint, stones, and the like grofs materials, does infinitely exceed, because it is for ever, preserves the drains hollow, and being a little moulded over, will produce good grafs, without any detriment to the ground; but this is a secret not yet well underftood, and would merit an expref paragraph, were it here feafonable.

——————et jam nos inter opacas
Muſa vocat Salices——————

The Crack Willow.

Published as the Act directs by J. Hunter & M.D. as the Act directs

J. Miller del et Sc

CHAP. XX.

The WITHY, SALLOW, OZIER, and WILLOW[1].

1. SALIX, the WILLOW. Since Cato has attributed the third place to the Salictum, preferring it even next to the very Ortyard, and (what one would wonder at) before even the Olive, Meadow, or Corn-field itself, I have thought good to be the more particular in my discourse upon

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[1] Of this GENUS there are thirty-one species, but I shall only enumerate such as are planted in this country for use. The species are:

1. SALIX *(ALBA)* foliis lanceolatis acuminatis serratis utrinque pubescentibus; serraturis infimis glandulosis. Lin. Sp. Pl. 1449. *Willow with spear-shaped, acute-pointed, sawed leaves, which are downy on both sides, and glands below the saws.* Salix vulgaris alba arborescens. C. B. P. 453. *THE WHITE WILLOW.*

This is the common White Willow, which is frequently found growing on the sides of rivers and ditches in many parts of England. It grows to a large size, if the branches are not lopped off; the shoots are covered with a smooth, pale, green bark; the leaves are spear-shaped, between three and four inches long, and nearly one broad in the middle, drawing to a point at each end; they are very white on their under side, and their upper side is covered with short, white, woolly hairs, though not so closely as the under; the catkins are short and pretty thick. The wood is very white, and polishes smooth, on which account it is much sought after for milk-pails, &c.

2. SALIX *(TRIANDRIA)* foliis serratis glabris, floribus triandris. Lin. Sp. Plant. 1442. *Willow with smooth sawed leaves, and flowers having three stamina.* Salix, folio auriculato splendente, flexilis. Raii. Hist. 1420. *Willow with lucid eared leaves and flexible branches. THE SMOOTH WILLOW.*

This sort grows to be a large tree; the young branches are covered with a grayish bark; the leaves are smooth, and of a lucid green, ending in acute points; they are eared at their base, and sawed on their edges, and are green on both sides; the branches grow pretty erect and are flexible. This is frequently planted in Ozier grounds for the basket-maker. The catkins are long and narrow, and the scales open and acute-pointed.

3. SALIX *(PENTANDRIA)* foliis serratis glabris, flosculis pentandris. Lin. Sp. Pl. 1442. *Willow with smooth sawed leaves, and flowers having five stamina.* Salix folio laureo, seu lato glabro odorato. Raii Hist. 1420. *Willow with a bay-leaf, or broad-leaf, smooth and sweet-scented. THE SWEET WILLOW.*

BOOK I. it; especially, since so much of that which I shall publish concerning Willows is derived from the long experience of a most learned and ingenious person, from whom I acknowledge to have received many of these hints. Not to perplex the reader with the various names, Greek,

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This has thick strong shoots covered with a dark-green bark; the leaves are broad, and rounded at both ends; they are very smooth, sawed on their edges, and when rubbed have a grateful smell. It is sometimes called the Bay-leaved Willow, and is a tree of quick growth. The branches are brittle, which makes them improper for many purposes.

4. SALIX *(VITELLINA)* foliis serratis ovatis acutis glabris; serraturis cartilagineis, petiolis calloso-punctatis. Lin. Sp. Pl. 1442. *Willow with smooth, oval, acute, sawed leaves, having cartilaginous indentures, and foot-stalks with callous punctures.* Salix sativa lutea, folio crenato. C. B. P. 473. *Yellow cultivated Willow with a crenated leaf.* THE GOLDEN WILLOW.

This sort has slender tough shoots, which are of a yellow colour; the leaves are oval, acute-pointed, smooth, and sawed on their edges; the saws are cartilaginous, and the foot-stalks of the leaves have callous punctures. Being very pliable, it is much planted in the Ozier grounds for the basket-maker, but it never grows to a large size.

5. SALIX *(AMYGDALINA)* foliis serratis glabris lanceolatis petiolatis, stipulis trapeziformibus. Lin. Sp. Pl. 1443. *Willow with smooth, spear-shaped, sawed leaves, having foot-stalks, and trapezium-shaped stipulæ.* Salix folio amygdalino utrinque virente aurito. C. B. P. 43. *Almond-leaved Willow with leaves which are eared, and green on both sides.* THE ALMOND-LEAVED WILLOW.

This is a Willow of the middle size, sending forth numerous, flexible, tough branches, covered with a light green bark. The leaves are spear-shaped, smooth, serrated, acute, eared at their base, and of a light green colour on both sides. The flowers are oblong catkins, which turn to a light down in the summer. There are several sorts of this species which are of inferior value; but this is generally distinguished from the others by the name of the Old Almond-leaved Willow. The branches are very tough and flexible, and when planted in the Ozier way, and grown one year from the stools, are very strong, and highly serviceable for the different purposes of basket-making.

6. SALIX *(FRAGILIS)* foliis serratis glabris ovato-lanceolatis, petiolis dentato-glandulosis. Lin. Sp. Pl. 1442. *Willow with oval spear-shaped, smooth, sawed leaves, and dentated glandular foot-stalks.* Salix folio longo latoque splendente, fragilis. Raii Syn. 3. p. 448. THE CRACK WILLOW.

This grows to a middle size; the shoots are covered with a brownish bark, and very brittle, so are unfit for the basket-maker. The leaves are near five inches long, and one broad, are of a lucid green on both sides, and sawed on their edges; the catkins are long and slender, and the scales are pretty long, acute-pointed, and stand open. It is commonly called the Crack Willow, from the branches being very brittle.

7. SALIX *(PURPUREA)* foliis serratis glabris lanceolatis; inferioribus oppositis.— Lin. Sp. Pl. 1444. *Willow with smooth, spear-shaped, sawed leaves, the lower of which grow*

Gallic, Sabinian, Amerine, &c. better distinguished by their growth and bark, and by Latin authors all comprehended under that of Salices, our English books reckon them promiscuously thus: The Common White Willow, the Black, and the Hard Black, the Roſe of Cambridge, CHAP. XX.

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oppoſite. Salix folio longo subluteo non auriculato, viminibus rubris. Raii Syn. 450.—*THE PURPLE WILLOW.*

This is a tree of middling size; the shoots are very pliable, and fit for the basket-maker, which recommends it for the Ozier grounds; they are of a reddish colour; the leaves are spear-shaped, smooth, and sawed on their edges: those on the lower part of the branches are placed oppoſite, but on the upper they are alternate, and of a yellowish green.

8. SALIX *(FIMINALIS)* foliis subintegerrimis lanceolato-linearibus longiſsimis acutis subtus sericeis, ramis virgatis. Lin. Sp. Pl. 1448. *Willow with the longeſt, linear ſpear-ſhaped, acute leaves, which are almoſt entire, and ſilky on their under ſide, and rod-like branches.*—Salix foliis angustis et longiſsimis crispis subtus albicantibus. J. B. i. p. 212. *Willow with the longeſt, narrow, curled leaves, which are white on their under ſide.* *THE OZIER.*

The Ozier is a tree of low growth, though the shoots grow amazingly long and strong in one year from the stools. The leaves are spear-shaped, narrow, long, acute, almost entire, of a blueish green on their upper side and hoary underneath, and grow on very short foot-stalks. This is the most propagated of all the kinds for basket-making: It admits of several sorts of different value, but all are useful to the basket-maker. The varieties usually go by the names of the Green Ozier, the Old Basket Ozier, Welsh Wicker, &c.

9. SALIX *(RUBRA)* foliis integerrimis glabris lineari-lanceolatis acutis. Huds. Flor. Angl. 428. *Willow with entire, linear ſpear-ſhaped, ſmooth leaves.* Salix minimè fragilis foliis longiſsimis utrinque viridibus, non serratis. Raii Syn. 449. *The leaſt brittle Willow, with very long leaves which are green on both ſides, and not ſawed.* *THE RED WILLOW.*

This sort having very pliant branches, is much planted in the Ozier grounds. The leaves are very long; are spear-shaped and entire, and green on both sides. It grows to a middling size, if planted in moist land.

10. SALIX *(BABYLONICA)* foliis serratis glabris lineari-lanceolatis, ramis pendulis.—Lin. Sp. Pl. 1443. *Willow with ſmooth, ſawed, linear ſpear-ſhaped leaves, and hanging branches.*—Salix Orientalis, flagellis deorsum pulchrè pendentibus. Tourn. Cor. 41. *THE BABYLONIAN, or WEEPING WILLOW.*

The Weeping Willow of Babylon grows to a considerable size. Its branches are long, slender, and pendulous, which makes it proper to be planted upon the banks of rivers, ponds, and over springs; the leaves are long and narrow; and when any mist or dew falls, a drop of water is seen hanging at their extremities, which, together with the hanging branches, gives this tree a most mournful look. On that account, garlands of forsaken lovers were made of the twigs of this Willow.——"I offered him my company to a Willow-tree, to make him "a garland as being forsaken."—SHAKSPEARE.

It is probable that under those trees the children of Israel mourned their captivity. "By the "rivers of Babylon, there we sat down, yea we wept when we remembered Zion: We hanged "our harps upon the Willows in the midst thereof."—PSALMS.

BOOK I. the Black Withy, the Round Long Sallow, the Longest Sallow, the Crack Willow, the Round-eared Shining Willow, the leſser Broad leaved Willow, Silver Sallow, Upright Broad Willow, Repent Broad-leaved, the Redstone, the Leſser Willow, the Straight Dwarf, the Yellow Dwarf,

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11. SALIX *(HELIX)* foliis serratis glabris lanceolato-linearibus, superioribus oppositis obliquis. Lin. Sp. Pl. 1444. *Willow with linear, ſpear-ſhaped, ſmooth, ſawed leaves, the upper of which are placed obliquely oppoſite.* Salix humilior, foliis angustis subcæruleis ex adverso binis. Raii Syn. 2. p. 297. *THE ROSE WILLOW.*

The Rose-Willow is of much lower growth than the former. The body of the tree is covered with a rough, yellow bark. The branches are upright, tough, and of a reddish colour. The leaves are spear-shaped, narrow, smooth, of a blueish green colour, and, towards the upper part of the branches, are nearly opposite to each other. The flowers come out from the sides of the branches, and numbers of them are joined together in a rose-like manner, forming a singular and beautiful appearance. This however is not a flower, but an accidental excrescence, occasioned by a wound made in the bark of the tender branches by a certain fly, for the reception of its egg, which soon produces a worm. This insect is minutely described by Swammerdam in his "Book of Nature." Our old English botanists being unacquainted with this part of natural history, supposed the tree a distinct species, and called it Salix Rosea.

12. SALIX *(CAPREA)* foliis ovatis rugosis, subtus tomentosis, undatis superne denticulatis. Lin. Sp. Pl. 1448. *Willow with oval rough leaves which are waved, woolly on their under ſide, and indented towards the top.* Salix latifolia rotunda. C. B. P. 474. *THE SALLOW.*

The Sallow is well known all over England, and delights in a dry rather than a moist soil. It it a tree rather below the middle growth. The branches are brittle, smooth, of a dark green colour, and their chief use is for hurdle-wood and the fire; though the trunk, or old wood, is admirable for several uses in the turnery way. The leaves are oval, rough, waved, indented at the top, and woolly underneath. The catkins are very large and white; they appear early in the spring, and are much resorted to by the bees, on their first coming out of their hives at that early season.—There is a variety of this species with long leaves, which end in acute points; and another with smooth leaves, beautifully striped with white, called the Striped Sallow.

13. SALIX *(HERMAPHRODITICA)* foliis serratis glabris, floribus hermaphroditis diandris. Lin. Sp. Pl. 1442. Salix latifolia folio splendente. Raii Syn. 450. *THE SHINING WILLOW.*

This is a large growing tree, sending forth several slender branches, which hang down and are covered with a pale brown bark. The leaves are smooth, glandalous, serrated, and of a yellowish green colour. The flowers are numerous hairy catkins, and the male flowers have two stamina only. They appear early in the spring; and the females are succeeded by downy seeds, like the common Willow.

14. SALIX *(PHYLICIFOLIA)* foliis serratis glabris lanceolatis: crenis undatis. Lin. Sp. Pl. 1442. *THE PHYLICA-LEAVED WILLOW.*

This is a tree of lower growth than the former. The branches are numerous, flexible, tough, and serviceable for several articles in the basket way. The leaves are spear-shaped, smooth,

the Long-leaved Yellow Sallow, the Creeper, the Black low Willow, the Willow-bay, and the Ozier. I begin with the Withy. CHAP. XX.

2. The WITHY is a reasonably large tree, (for some have been found WITHY.

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serrated, and waved on their edges. The flowers are long catkins, which come out early in the spring from the sides of the branches, and they soon afford a large quantity of down.

15. SALIX *(HASTATA)* foliis serratis glabris subovatis acutis sessilibus, stipulis subcordatis. Lin. Sp. Pl. 1443. *THE HASTATED WILLOW.*

This is a middle-sized tree, sending out several long green shoots from the stools, which are very full of pith, but nevertheless tough and useful for the basket-maker. The leaves are nearly oval, acute, smooth, serrated, sit close to the branches, and have very broad appendices to their cases. The flowers are an oblong yellow catkin, and come out in the spring from the sides of the young shoots.

The WILLOW belongs to the class and order *Dioecia Diandria*, having male and female flowers on separate plants, and whose male-flowers have two stamina. The flowers of that species called the Sallow make their appearance about the eleventh of March, and the leaves are out by the Seventh of April. The leaves of the Weeping Willow appear about the first of that month; and the buds of the White Willow swell about the tenth. By the eighteenth, the leaves are quite out, and the flowers full blown. The catkins of the Sallow are formed about the fifth of October.

The Willow, Sallow, and Ozier, from the quickness of their growth, naturally claim the attention of such Gentlemen as have lands suitable to their cultivation; and indeed the immediate profit that they yield makes them a desirable object of attention. In order to raise a bed of Oziers the ground should be dug over, or ploughed; but where expence is not a consideration, the preference should be given to the spade. The cuttings must then be procured; and although they should consist chiefly of the true Ozier kinds, yet other sorts must be introduced into the Ozier bed, to make it complete, and more useful to the basket-maker, who will want the different sorts for the different purposes of his trade. Besides the true Ozier, of which the plantation is chiefly to consist, there must be the Sallow, the long-shooting Green Willow, the Crane Willow, the Golden Willow, the the Silver Willow, the Welsh Wicker, &c.; by which names they are best known.

The cuttings should be of two years wood, though the bottom parts of the strongest one-year shoots may do. They ought to be two feet and a half long, a foot and a half of which should be thrust into the ground, and the other foot should remain for the stool. These cuttings should be put in at two feet two inches distance each way; and all the summer following the weeds must be kept under; the summer after that, the tallest of the weeds should be hacked down. The Willows must continue growing for three years, when they should be all cut down to the first-planted head. They will sell well to the hurdle-maker; and there will be a regular quantity of proper stools left, to exhibit an annual crop of twigs, which will be worth five or six pounds, or more, per acre, to be sold to the basket-maker. But the price of the twigs is greater or less, in proportion to the nature

BOOK I.

ten feet about) and is fit to be planted on high banks, and ditch sides within reach of water, and the weeping sides of hills, because it extends its roots deeper than either Sallows or Willows. For this reason, you should plant them at ten or twenty feet distance; and though they grow the slowest of all the twiggy trees, yet do they recompense it with the larger crop, the wood being tough, and the twigs fit to bind strongly; the very

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of the situation. Watery ground, by the sides of navigable rivers, planted in this manner, will produce a greater price per acre; because near such places there generally reside a number of basket-makers, who, having the conveniency of water-carriage, can send their work, with more ease to distant places.

Plantations of these kinds may not only be regularly made to great advantage on watery and, by the sides of rivers, but the very islands, or any part where there is mud or earth, may be planted this way, to the great profit of the proprietor. And here suffer me to give one caution in the planting of these places: Let the rows, which should always run the same way with the stream, be at a greater distance from each other, and the cuttings proportionably closer in the rows. I advise the distance of the rows to be greater in these places, that the floods may have free liberty to carry off the sludge, which would otherwise be detained to the prejudice of the sets. Plantations of Willows to be cut down every six or seven years for poles, should be raised in the same manner, remembering that the sets should be placed at a greater distance, viz. one yard; but when designed for hurdles, to be cut every second or third year, the distance need not be so great.

In order to raise a Salictum, or Plantation of Willows for timber, the ground must be dug or ploughed; and the cuttings for this purpose should be of the last year's shoot. They ought to be a foot and a half long, and a foot of each should be thrust into the ground, at the distance of three feet each way. The latter end of May, or the beginning of June, the plantation should be looked over; when such sets as have shot out too luxuriantly should have all the branches removed, except the strongest leading shoot. All this summer and the next, the weeds must be kept down; afterwards, the trees will demand no farther care till the time of thinning, which will be in about five or six years. When the branches interfere with each other, the weakest tree should be grubbed up and taken away, to make room for the remainder. In five or six years more they will require a second thinning. In this manner they must be thinned as often as they touch one another, till the trees are arrived to their full maturity. By planting the cuttings a yard asunder at first, and afterwards thinning of them, they not only draw each other up, and by that means aspire to a great height, but the plants taken away to make room for the strongest, will bring in a considerable profit when sold as poles.

The sorts used for plantations of these trees have hitherto been the common white and red Willow. These, however, seem now to give place to other kinds which have been lately introduced.

Sets proper to be planted by the sides of ditches, &c. for pollards, should be nine feet in length, two feet and a half of which must be thrust into the ground, having first prepared the way by driving down a crow, or some such instrument, to prevent the bark from

peelings of the branches being useful to bind arbor-poling, and in topiary works, vineyards, espalier-fruit, and the like: And we are told of some that have been twisted into ropes of an hundred and twenty paces, serving instead of cables. There are two principal sorts of these Withies, the Hoary, and the Red Withy, which is the Greek; toughest, and fittest to bind, whilst the twigs are flexible and tender. CHAP. XX.

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separating from the stem. After they are planted, they should be thorned from cattle; and in five or six years they will be fit for lopping; and thus they may continue to be lopped every fifth or sixth year, to the improvement of ditch-sides, water-gutters, &c. were it only for the fuel, as it emits little smoke, and is remarkably sweet; it burns pure and clear to the last, and therefore proper for ladies' chambers, and such people as are curious in procuring the sweetest sorts of fire-wood.

Willows may be planted in the autumn, but the spring is the surest season. The planting however should not be delayed later than February, as the shoots of the succeeding year would not only be retarded, but the stools from whence they were taken greatly injured.

Amongst the antients, the Willow was appropriated to many uses, but it was chiefly cultivated for binders, to be employed in the vineyard. With them, every thing that regarded the cultivation of the Vine was attended to with scrupulous exactness; and Columella, when describing the different things requisite for the vineyard, emphatically styles Willows, Reeds, and Chesnut-trees, "the dowries" for vineyards. Of Willows, binders were made; Reeds made frames; and Chesnut-poles were employed for props. The quantity of land required for each of these is thus described by Columella. One acre *(jugerum)* of Willow-ground will raise binders sufficient for twenty-five acres of vineyard. A single acre planted with Reeds, is sufficient for furnishing frames for twenty acres; an acre planted with Chesnut-trees is enough for propping as many acres as an acre planted with Reeds can furnish frames for. Lib. iv. cap. xxx.

The antient Britons used boats made of Wicker, covered with skins, for passing rivers and arms of the sea:

> Primum cana Salix madefacto vimine parvam
> Texitur in puppim, cæsoque induta Juvenco,
> Vectoris patiens, tumidam superenicat amnem.
> Sic Venetus, stagnante Pado, fusoque Britannus
> Navigat Oceáno.———————— LUCAN.

Besides these boats, our rude forefathers knew how to make baskets of Wicker, which were held in estimation even at Rome. Of these Martial says,

> Barbara de pictis veni Bascauda Britannis:
> Sed me jam mavult dicere Roma suam.

BOOK I.

SALLOW.

3 Sallows grow much faster, if they are planted within reach of water, or in a very moorish ground, or flat plain; and where the soil is, by reason of extraordinary moisture, unfit for arable or meadow; for in these cases it is an extraordinary improvement: In a word, where Birch and Alder will thrive. Before you plant them, it is found best to turn the ground with a spade, especially if you design them for a flat. We have three sorts of Sallows amongst us, (which is one more than the antients challenged, who name only the Black, and White, which was their Nitellina,) the Vulgar Round-leaved, which proves best in drier banks, and the Hopping Sallows, which require a moister soil, growing with incredible celerity; and a third kind, of a different colour from the other two, having the twigs reddish, the leaf not so long, and of a more dusky green; more brittle whilst it is growing in twigs, and more tough when arrived to a competent size. All of them useful for the Thatcher.

4. Of these, the Hopping Sallows are in greatest esteem, being of a clearer terse grain, and requiring a more succulent soil; best planted a foot deep, and a foot and a half above ground, (though some will allow but a foot) for then every branch will prove excellent for future settlings. After three years growth, being cropped the second and third, the first year's increase will be betwixt eight and twelve foot long generally; the third year's growth, strong enough to make rakes and pike-staves; and the fourth, for Mr. Blithe's trenching plough, and other like utensils of the husbandman.

5. If you plant them at full height (as some do at four years growth, setting them five or six feet in length, to avoid the biting of cattle) they will be less useful for straight staves, and for settlings, and make less speed in their growth; yet this also is a considerable improvement.

6. These would require to be planted at least five feet distance, (some set them at much more,) and in the quincunx order: If they affect the soil, the leaf will become large, half as broad as a man's hand, and of a more vivid green, always larger the first year than afterwards: Some plant them sloping, and cross-wise, like a hedge; but this impedes their wonderful growth; and though Pliny seems to commend it, (teaching us how to excorticate some places of each set, for the sooner production of shoots,) it is but a deceitful fence, neither fit to keep out swine nor

sheep; and being set too near, inclining to one another, they soon destroy each other. CHAP. XX.

7. The worst Sallows may be planted so near, yet as to be instead of stakes in a hedge, and then their tops will supply their dwarfishneſs; and, to prevent hedge-breakers, many do thus plant them, because they cannot easily be pulled up after once they have struck root.

8. If some be permitted to wear their tops five or six years, their palms will be very ample, and yield the first and most plentiful relief to bees, even before our Apricots bloſsom. The Hopping Sallows open and yield their palms before other Sallows; and when they are blown, (which is about the exit of May, or sometimes June,) the palms (or ὠλεσικαρποι, Frugiperdæ, as Homer terms them) are four inches long, and full of a fine lanuginous cotton. Of this sort, there is a Salix near Darking in Surrey, in which the Julus bears a thick cottonous substance: A poor body might in an hour's space gather a pound or two of it, which resembling the finest silk, might doubtleſs be converted to some profitable use by an ingenious housewife, if gathered in calm evenings, before the wind, rain, and dew impair them: I am of opinion, if it were dried with care, it might be fit for cushions, and pillows of chastity; for such of old was the reputation of the shade of those trees.

9. Of these Hopping Sallows, after three years rooting, each plant will yield about a score of staves of full eight feet in length, and so following, for use, as we noted above. Compute then how many fair pike-staves, perches, and other useful materials, that will amount to in an acre, if planted at five feet interval; but a fat and moist soil requires indeed more space than a lean or drier, namely, six or eight feet distance.

10. You may plant settlings of the very first year's growth; but the second year they are better, and the third year better than the second, and the fourth as good as the third, especially if they approach the water. A bank at a foot distance from the water, is kinder for them than a bog, or to be altogether immersed in the water.

11. It is good to new-mould them about the roots every second or third year; but men seldom take the pains. It seems that Sallows are more

BOOK I. hardy than even Willows and Oziers; of which Columella takes as much care as of Vines themselves. But it is cheaper to supply the vacuity of accidental decays by a new plantation, than to be at the charge of digging about them three times a year, as that author advises, seeing some of them will decay whatever care be used.

12. Sallows may also be propagated like Vines, by courbing and bowing them in arches, and covering some of their parts with mould, &c. also by cuttings and layers, and some years by the seeds likewise.

13. For settlings, those are to be preferred which grow nearest to the stock, and so (consequently) those worst which most approach the top. They should be planted in the first fair and pleasant weather in February, before they begin to bud: we about London begin at the latter end of December. They may be cut in spring for fuel, but best in autumn for use; but in this work (as of Poplar) leave a twig or two, which being twisted arch-wise, will produce plentiful sprouts, and suddenly furnish a head.

14. If in our copses every fourth set were a Sallow, amongst the rest of varieties, the profit would recompense the care; therefore where in woods you grub up trees, thrust in truncheons of Sallows, or some aquatic kind. In a word, an acre or two furnished with this tree, would prove of great benefit to the planter.

15. The swift-growing Sallow is not so tough and hardy for some uses as the slower, which makes stocks for gardeners' spades; but it is proper for rakes, pikes, mops, &c. Sallow-coal is the soonest consumed, but of all others the most easy and accommodate for painters' scriblets to design their work, and first sketches on paper, &c. as being fine, and apt to slit into pencils. Of the Sallow (as of the Lime-tree) is made the shoemakers' carving or cutting boards, as best to preserve the edge of their knives, for its equal softness every way.

OZIER. 16. OZIERS, or the aquatic and lesser Salix, are of innumerable kinds, commonly distinguished from Sallows, as Sallows are from Withies, being so much smaller than the Sallows, and shorter lived, and requiring more

constant moisture, yet should be planted in rather a dryish ground, than over moist and spewing, which we frequently cut trenches to avert. It likewise yields more limber and flexible twigs for baskets, flaskets, hampers, cages, lattices, cradles, &c. It is of excellent use for the bodies of coaches and waggons, being light, durable, and neat, as it may be wrought and covered. It is good for chairs, hurdles, stays, bands, the stronger for being contused and wreathed; likewise for fish-weirs, and to support the banks of impetuous rivers: In fine, for all wicker and twiggy works;

Viminibus Salices———— VIRG.

17. But these sorts of Oziers should be cut in the new shoot; for if they stand longer they become more inflexible: Cut them close to the head, a foot or so above the earth, about the beginning of October, unless you will attend till the cold be past, which is better; and yet we about London cut them in the most piercing seasons, and plant them also till Candlemas, which those who do not observe, we judge ill husbands, as I learn from a very experienced basket-maker; and in the decrease, for the benefit of the workman, though not altogether for that of the stock, and succeeding shoot. When they are cut, make them up into bundles, and give them shelter; but such as are for white work, as they call it, being thus fagotted and made up in bolts, as they term is, severing each sort by themselves, should be set in water, the ends dipped; and indeed all peeled wares of the viminious kind are not otherwise preserved from the worm; but for black and unpeeled, shelter them under covert only, or in some vault or cellar, to keep them fresh, sprinkling them now and then in excessive hot weather: The peelings of the former, or rather the splicings, are for the use of the gardener and cooper.

18. We have in England these three vulgar sorts; one of little worth, being brittle, and very much resembling the fore-mentioned Sallow, with reddish twigs, and more greenish and rounder leaves: Another kind there is, called Perch, of limber and green twigs, having a very slender leaf. The third sort is totally like the second, only the twigs are not altogether so green, but yellowish, and near the Popinjay: This is the very best for use, being tough and hardy. But the most usual names by which basket-makers call them about London, and which are all of different species, therefore to be planted separately, are, the Hard Gelster, the Horse

BOOK I. Gelster, Whining, or Shrivelled Gelster, the Black Gelster, with which Suffolk abounds. Then follow the Golstones, the Hard, and the Soft Golstone, (brittle and worst of all the Golstones;) the Sharp and Slender-topped Yellow Golstone; the Fine Golstone: Then is there the Yellow Ozier, the Green Ozier, the Snake or Speckled Ozier, Swallow-tail, and the Spaniard: To these we may add (for they are governed and used alike) the Flanders Willow, which will arrive to be a large tree, as big as one's middle, the oftener cut the better; with these our coopers tie their hoops to keep them bent. Lastly, the White Sallow, which being of one or two years growth, is used for green-work; and of the toughest sort they make quarter-can hoops, of which, for our seamen, great quantities are provided.

19. These choicer sorts of Oziers, which are ever the smallest, also the Golden Yellow and White, which is preferred for propagation and to breed of, should be planted of slips of two or three years growth, a foot deep, and half a yard in length, in moorish grounds or banks, or else in furrows; so that, as some direct, the roots may frequently reach the water, *Fluminibus Salices*——though we commonly find it rots them, and therefore never choose to set them so deep as to scent it.

20. The season for planting is January, and all February, though some not till Mid-February, at two feet square; but cattle being excefsively liquorish of their leaves and tender buds, some talk of graffing them out of reach upon Sallows, and by this to advance their sprouting; but as the work would consume time, so have I never seen it succeed.

21. Some do also plant Oziers, in their *Eyghts*, like Quick-sets, thick, and (near the water) keep them not more than half a foot above ground; but then they must be diligently cleansed from mofs, slab, and ouze, and frequently pruned, especially the smaller spires, to form single shoots, at least that few, or none, grow double; these they head every second year about September, the autumnal cuttings being best for use: But, generally

22. You may cut Withies, Sallows, and Willows at any mild and gentle season, between leaf and leaf, even in winter; but the most congruous time both to plant and to cut them is, *Crescente lunâ Vere, circa Calendas*

Martias; that is about the new moon, and first open weather of the early spring.

23. It is in France, upon the Loire, where these *Eyghts*, as we term them, and plantations of Oziers and Withies, are perfectly understood; and both there, and in divers other countries beyond seas, they raise them of seed contained in their Juli, or Catkins, which they sow in furrows, or shallow trenches, and it springs up like corn in the blade, and comes to be so tender and delicate, that they frequently mow them with a scythe. This we have atempted in England too, even in the place where I live; but the obstinate and unmerciful weeds did so confound them, that it was impoſsible to keep them clean with any ordinary industry, and so they were given over: It seems, either weeds grow not so fast in other countries, or that the people, which I rather think, are more patient and laborious.

Note,—That these Juli are not all of them seed-bearers, some are sterile, and whatever you raise of them will never come to bear; and therefore by some they are called the male sort, as Mr. Ray, that learned botanist, has observed. The Ozier is of that emolument, that in some places I have heard twenty pounds has been given for one acre; ten is in this part an usual price; and doubtleſs it is far preferable to the best corn-land, not only for that it needs but once planting, but because it yields a constant crop and revenue to the world's end; and is therefore, in esteem of knowing persons, valued in purchase accordingly; considered likewise how easily it is renewed, when a plant now and then fails, by but pricking in a twig of the next at hand, when you visit to cut them. We have in the parish near Greenwich, where I lately dwelt, improved land from leſs than one pound to near ten pounds the acre: And when we shall reflect upon the infinite quantities of them we yearly bring out of France and Flanders, to supply the extraordinary expence of basket-work, &c. for the fruiterers, lime-burners, gardeners, coopers, packers-up of all sorts of ware, and for general carriage, which seldom last above a journey or two, I greatly admire Gentlemen do not more think of employing their moist grounds (especially where tides near fresh rivers are reciprocal) in planting and propagating Oziers. To omit nothing of the culture of this useful Ozier, Pliny would have the place to be prepared by trenching it a foot and a half deep,

BOOK I. and in that to fix the sets, or cuttings, of the same length at six feet interval. These, if the sets be large, will come immediately to be trees; which after the first three years are to be abated within two feet of the ground; then in April he advises to dig about them. Some raise them abundantly by laying poles of them in a boggy earth only: Of these they formerly made vine-props, Juga, as Pliny calls them, for arch-wise bending, and yoaking, as it were, the branches to one another; and one acre hath been known to yield props sufficient to serve a vineyard of twenty-five acres.

24. John Tradescant brought a small Ozier from St. Omer's, in Flanders, which makes incomparable net-works, not much inferior to the Indian twig, or bent-works, which we have seen; but if we had them in greater abundance, we should haply want the artificers who could employ them, and the dexterity to varnish so neatly.

WILLOW. 25. Our common SALIX, or WILLOW, is of two kinds, the White and the Black: The White is also of two sorts, the one of a yellowish, the other of a browner bark: The Black Willow is planted of stakes of three years growth, taken from the head of an old tree, before it begins to sprout; set them of six feet high, and ten distant, as directed for the Poplar. Those woody sorts of Willow delight in meads and ditch-sides, rather dry than over wet; (for they love not to wet their feet, and last the longer;) yet the black sort, and the reddish, do sometimes well in more boggy grounds, and should be planted of stakes as big as one's leg, cut as the other, at the length of five or six feet; the hole made with an oaken stake and beetle, or with an iron crow, (some use a long auger,) so as not to be forced in with too great violence. But first, the truncheons should be a little sloped at both extremes, and the biggest planted downwards: To this, if they are soaked in water two or three days, (after they have been sized for length, and the twigs cut off before you plant them,) it will be the better. Let this be done in February, the mould as well closed to them as possible, and treated as was taught in the Poplar. If you plant for a kind of wood, or copse, for such I have seen, set them at six feet distance, or nearer in the quincunx, and be careful to take away all suckers from them at three years end; you may abate the head half a foot from the trunk; viz. three or four of the lustiest shoots, and the rest cut close, and bare them yearly, that the

three, four, or more you left may enjoy all the sap, and so those which were spared will be gallant pearchers within two years. Arms of four years growth will yield substantial sets, to be planted at eight or ten feet distance; and for the first three years well defended from the cattle, who infinitely delight in their leaves, green or withered. Thus, a Willow may continue twenty, or five-and-twenty years, with good profit to the industrious planter, being headed every four or five years; some have been known to shoot no lefs than twelve feet in one year, after which the old rotten dotards may be felled, and easily supplied: But if you have ground fit for whole copses of this wood, cast it into double dikes; making every fofs near three feet wide, and two and a half in depth; then leaving four feet at least of ground for the earth, (because in such plantations the moisture should be below the roots, that they may rather see than feel the water,) and two tables of sets on each side, plant the ridges of these banks with but one single table, longer and bigger than the collateral, viz. three, four, five, or six feet high, and distant from each other about two yards. These banks being carefully kept weeded for the first two years, till the plants have vanquished the grafs, and not cut till the third, you may lop them transverse, and not obliquely, at one foot from the ground, or somewhat more, and they will head to admiration; but such as are cut at three feet height are most durable, at least soft and aquatick: They may also be graffed betwixt the bark, or budded; and then they become so beautiful as to be fit for some kind of delightful walks; and this I wish were practised among such as are seated in low and marshy places, not so friendly to other trees. Every acre, at eleven or twelve years growth, may yield you near an hundred load of wood: Cut them in the spring for dreffing, but in the fall for timber and fuel. I have been informed that a Gentleman in Efsex has lopped no lefs than two thousand yearly, all of his own planting. It is far the sweetest of all our English fuel, Ash not excepted, provided it be sound and dry; and, emitting little smoke, is the fittest for Ladies' chambers; and all those woods and twigs should be cut either to plant, work with, or burn, in the driest time of the day.

To confirm what we have advanced in relation to the profit which may be made by this husbandry, see what comes to me from a worthy person

whom we shall have occasion to mention, with great respect, in the chapter of Quicksets.

The considerable improvement which may be made in common fields as well as inclosed grounds, he demonstrates by a little spot of meadow of about a rod and half; part of which being planted, about fifty years since, with Willows, (in a clump not exceeding four poles in length, on one side about twelve,) several of them at the first and second lopping, being left with a strait top, run up, like Elms, to thirty or forty feet in height; which some years since yielded boards of fourteen or fifteen inches broad, as good for flooring and other purposes within doors, as deals, last as long, work finer, white and beautiful: It is indeed a good while since they were planted, but it seems the crop answered his patience, when he cut up as many of them (the year 1700) as were well worth ten pounds; and since that another tree, for which, with those that were left, a joiner offered him as much, which was more by half than the whole ground itself was worth; so as having made twenty pounds of the spot, he still poſseſses it without much damage to the graſs. The method of planting was first by making holes with an iron crow, and widening them with a stake of wood, fit to receive a lusty plant, and sometimes boring the ground with an auger; but neither of these succeeding; (by reason the earth could not be rammed so close to the sides and bottom of the sets as was requisite to keep them steady, and seclude the air, which would corrupt and kill the roots,) he caused holes, or little pits, of a foot square and depth to be dug, and then making a hole with the crow in the bottom of the pits to receive the set, and breaking the turf which came out of it, rammed it in with the mould close to the sets, (as they would do to fix a gate-post,) with great care not to gall the bark of it. He had divers times before this miscarried, when he used formerly to set them in plain ground, without breaking the surface, and laying it close to the sets; and therefore, if the soil be moist, he digs a trench by the side of the row, and applies the mould which comes out of it about the sets; so that the edge of the bank, raised by it, may be somewhat higher than the earth next the set, for the better descent of the rain, and advantage of watering the sets in dry weather; preventing likewise their rooting in the bank, which they would do if the ground next the plant or set

were made high, and sloped; and being left unfenced, cattle would tread down the bank, and lay the roots bare; the ground should therefore not be raised above two or three inches towards the body of the set.— Now if the ground be dry, and want moisture, he chooses to bank them round, the foſses environing the mound and hillock, being reserves for the rain, cools and refreshes the sets.

He farther instances, that Willows of about twenty years growth have been sold for thirty shillings, and speaks of one sold for three pounds; which was well worth five pounds. He affirms, that the Willows planted in beds between double ditches, in boggy ground, may be fit to be cut every five years, and pay as well as the best meadow-pasture; which is an extraordinary improvement.

26. There is a sort of Willow of a slender and long leaf, resembling the smaller Ozier, but rising to a tree as big as the Sallow, full of knots, and of a very brittle spray, only here rehearsed to acknowledge the variety.

27. There is likewise the Garden-Willow, which produces a sweet and beautiful flower, fit to be admitted into our hortulan ornaments, and may be set for partitions of squares; but they have no affinity with the others. There is also in Shropshire another very odoriferous kind, extremely fit to be planted by pleasant rivulets, both for ornament and profit: It is propagated by cuttings or layers, and will grow in any dry bottom, so it be sheltered from the south, affording a wonderful and early relief to the industrious bee. Vitruvius commends the Vitex of the Latines (impertinently called Agnus Castus, the one being but the interpretation of the other) as fit for building; I suppose they had a sort of better stature than the shrub growing among the curious with us, and which is celebrated for its chaste effects, and for which the antients employed it in the rites of Ceres: I rather think it more convenient for the sculptor, which he likewise mentions, provided we may, with safety, restore the text, as Perrault has attempted, by substituting Levitatem for the author's Rigiditatem; stubborn materials being not so fit for that curious art.

BOOK I.

28. Wherein most of the former enumerated kinds differ from the Sallows, is indeed not very considerable, they being generally useful for the same purpose; as for boxes, such as apothecaries and goldsmiths use; for cart saddle-trees, yea gun-stocks and half-pikes; harrows, shoemakers' lasts, heels, clogs for pattens; forks, rakes, especially the teeth, which should be wedged with Oak; but let them not be cut for this when the sap is stirring, because they will shrink; for pearchers, rafters for hovels, portable and light ladders, hop-poles, ricing of kidney-beans, and supporters to vines, when our English vineyards come more in request: Also for hurdles, sieves, lattices; for the turner, kyele-pins, great town tops; for platters, little casks and vefsels, especially to preserve verjuices in, the best of any. Pales are made of cleft Willow; also dorses, fruit-baskets, cans, hives for bees, trenchers, trays, &c. and for polishing and whetting table-knives, the butler will find it above any wood or whetstone; it makes coals, bavin, and excellent firing, not forgetting the fresh boughs, which, of all the trees in nature, yield the chastest and coolest shade in the hottest season of the day; and this umbrage so wholesome, that physicians prescribe it to feverish persons, permitting them to be placed even about their beds, as a safe and comfortable refrigerium. The wood being preserved dry, will dure a very long time[k]; but that which is found wholly putrefied, and reduced to a loamy earth in the hollow trunks of superannuated trees, is, of all other, the fittest to be mingled wirh fine mould, for the raising our choicest flowers, such as Anemonies, Ranunculuſses, Auriculas, and the like.

Quid majora sequar? Salices, humilesque genistæ,
Aut illæ pecori frondem, aut pastoribus umbram
Sufficiunt, sepemque satis, et pabula melli. GEORG. ii.

What would be more? Low Broom, and Sallows wild,
Or feed the flock, or shepherds shade, or field
Hedge about, or do us honey yield.

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[k] Willows, and all the soft woods, when uſed for poles or other purposes, should be stripped of their bark and steeped in water for some months, which will prevent the worm, and render the wood much more durable.

29. Now by all these plantations of the aquatic trees, it is evident the Lords of moorish commons and unprofitable wastes may learn some improvement, and the neighbour bees be gratified, and many tools of husbandry become much cheaper. I conclude with Pliny's note upon these kind of trees, after he has enumerated the universal benefit of the Salictum: *Nullius enim tutior est reditus, minorisve impendii, aut tempestatum securior.*

CHAP. XXI.

The YEW, HOLLY, CORNUS, and BOX.

TAXUS, the YEW[1]. Since the use of bows is laid aside amongst us, the propagation of this tree is quite forborne. But the neglect of it is to be deplored; seeing that the barrenest grounds, and coldest of our mountains

——Aquilonem et frigora taxi.

might be profitably replenished with it: I say, profitably; for, besides the use of the wood for bows,

——Ityræos taxi torquentur in arcus.

the artists in Box, inlayers, and cabinet-makers (particularly for marquetry floors) most gladly employ it; and in Germany they wainscot their stoves

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[1] We have but one species of this tree in Europe, viz.

TAXUS *(baccata)* foliis approximatis. Lin. Sp. Plant. 1472. *Yew-tree with leaves growing near each other.* THE COMMON YEW-TREE.

It is of the class and order *Dioecia Monadelphia.*

This tree grows naturally in England, and also in most of the northern countries of Europe, and in North-America. If suffered to grow, it will rise to a good height, with a very large stem. It naturally sends out branches on every side, which spread out, and are almost horizontal; these are closely garnished with narrow, stiff, blunt-pointed leaves, of a very dark green. The flowers come out from the sides of the branches in clusters; the male-flowers having many stamina, are more conspicuous than the female; these for the most part are upon different trees, but sometimes are upon the same tree; they appear the latter end of May, and the berries ripen in autumn.

The Yew-tree has been generally cultivated for the pleasure-garden, to be clipped into the shape of beasts, birds, &c. or for hedges. Whoever is pleased with such figures, can raise no tree more proper for the purpose, as the branches and the leaves may be clipped and fashioned into almost any form or shape. But as this method is justly exploded, and as every one who has the least pretension to taste, must always prefer a tree in its natural growth to those monstrous figures, the Yew is now chiefly planted for wilder-

The Yew Tree.

J. Miller del. & Sc.

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with boards of this material; For the cogs of mills, posts to be set in moist grounds, and everlasting axle-trees, there is none to be compared with it. It is likewise used for the bodies of lutes, theorboes, bowls, wheels, and pins for pulleys; yea, for tankards to drink out of. CH. XXI.

Notwithstanding what Pliny reports concerning its shade, the stories of the air about Thasius, the fate of Cativulcus, mentioned by Cæsar, and the ill report which the fruit has vulgarly obtained in France, Spain, and Arcadia, I shall venture to say

Quam multa arboribus tribuuntur crimina falsò?

How are poor trees traduc'd?

The toxic quality was certainly in the liquor, which the good fellows tippled out of the bottles* made of this tree, and not in the nature of the wood; which yet Pliny affirms is cured of that venenous quality, by driving a brazen wedge into the body of it. This I have never tried, but that of the shade and fruit I have frequently, without any deadly

* Vasa etiam Viatoria ex ea vinis in Gallia facta, mortifera fuisse compertum est.—PLIN. lib. xvi.

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nesss quarters, and for hedges, for which service it is excellently well adapted, as no tree bears clipping so well.

These trees may be easily propagated by sowing their berries in autumn, as soon as they are ripe, (without clearing them from the pulp which surrounds them, as by some gardeners recommended) upon a shady bed of fresh undunged soil, covering them over about half an inch thick with the same earth.

In the spring the bed must be carefully cleared from weeds, and if the season prove dry, it will be proper to refresh it with water now and then, which will promote the growth of the seeds, some of which will come up the same spring, but the greatest part will remain in the ground until autumn or the spring following.

The plants, when they come up, should be constantly cleared from weeds, which, if permitted to grow amongst them, will cause their bottoms to be naked, and frequently destroy the plants when they continue long undisturbed.

In this bed the plants may remain two years; after which, in autumn, there should be a spot of fresh undunged soil prepared, into which they should be removed the beginning of October, planting them in beds about four or five feet wide, in rows about a foot asunder, and the same distance from each other in the rows, observing to lay a little mulch upon the surface of the ground about the roots, as also to water them in dry weather until they have taken root; after which they will require no farther care, but to keep them clear from weeds in summer, and to trim them according to the purposes for which they are intended.

BOOK I. or noxious effects: So that I am of opinion, that the tree which Sextius calls Smilax, and our historian thinks to be our Yew, was some other wood; and yet I acknowledge that it is esteemed noxious to cattle when it is in the seeds, or newly sprouting; though I marvel there appears no more such effects of it, both horses and other cattle being free to browse on it, where it naturally grows: But what is very odd, if true, is that which the late Mr. Aubrey recounts (in his Miscellanies) of a Gentlewoman that had long been ill, without any benefit from the physician. She dreamed that a friend of her's, deceased, told her mother, that if she gave her daughter a drink of Yew pounded, she should recover; it was accordingly given her, and she presently died.—The mother being almost distracted for the loſs of her daughter, her chamber-maid, to comfort her, said, Surely, what she gave her was not the occasion of her death, and that she would adventure on it herself;

In these beds they may remain two or three years, according as they have grown, when they should again be removed into the nursery, placing them in rows at three feet distance, and the plants eighteen inches asunder in the rows; observe to do it in autumn, as was before directed, and continue to trim them in the summer season, according to the design for which they are intended; and after they have continued three or four years in this nursery, they may be transplanted where they are to remain; always observing to remove them in autumn when intended for dry ground, but for cold moist land the spring is the better season.

These trees, though of slow growth, do sometimes arrive at a considerable size. Mr. Pennant mentions one in Fontingal churchyard, in the Highlands of Scotland, whose ruins measured fifty-six feet and a half in circumstance.

Of the Yew there is a variety with short leaves, which appears very ornamental in plantations. There is also another with striped leaves, of great value amongst the variegated tribes. These are increased by layers, but the striped sort must be planted upon a barren soil, otherwise it will become plain.

In the days of Archery, so great was the demand for the wood of the Yew-tree, that the merchants were obliged by statute to import four staves of it for every ton of goods coming from places where bow-staves had formerly been brought. In those antient days the Yew was planted in churchyards, where it stood a substitute for the *Invisa Cupreſsus*. It also was placed near houses, where it might be ready for the sturdy bows of our warlike Ancestors,

——————————"who drew,
"And almost joined, the horns of the tough Yew."

Mr. Pennant informs us that this tree is to be found in its native state upon the hills that bound the waters of the Winander, and on the face of many precipices of different places

she did so, and died also [m]! Whether all this be but a dream, I cannot tell, but it was haply from those lugubrous effects that garlands of Taxus were usually worn at funerals, as Statius implies in Epicedium Vernæ: However, to prevent all funest accidents, I commend the tree only for the usefulneſs of the timber, and hortulan ornament. That we find it so universally planted in our churchyards, was, doubtleſs, from its being thought a symbol of immortality, the tree being so lasting, and always green. Our bee-masters banish it from about their apiaries.

One thing more, whilst I am speaking of this tree: It reminds me of that very odd story I find related by Mr. Camden, of a certain amorous clergyman, that falling in love with a pretty maid who refused his addreſses, cut off her head; which being hung upon a Yew-tree till it was rotten, the tree was reputed so sacred, not only whilst the virgin's head hung

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in this kingdom. There are six remarkable trees of this sort now growing on the hill above Fountain's Abbey, near Ripon, which, in 1770, measured in circumference as below:

	Feet.	*Inch.*		*Feet.*	*Inch.*
1	13	0	4	21	0
2	18	0	5	25	0
3	19	0	6	26	6

Under these very trees a number of Monks resided, until they built the Monastery of Fountains in 1133, having withdrawn themselves from the Benedictine Monastery of St. Mary in York.

The best reason that can be given why the Yew was planted in churchyards, is, that branches of it were often carried in proceſsion, on Palm Sunday, instead of the Palm. The following extract from Caxton's Direction for keeping feasts all the year, is decisive on this custom. In the lecture for Palm Sunday, he says, "Wherefore Holy Chirch this day makyth solemn proceſsyon, in mind of the proceſsyon that Cryst made this day. But for encheson that we have none Olyve that bereth grene leef, algate therefore we take Ewe instede of Palm and Olyve, and beren about in proceſsyon, and so is thys day called Palm Sonday." As a confirmation of this fact, the Yew-trees in the churchyards of East Kent are at this day called Palms.

[m] My most excellent and learned friend Dr. Percival of Manchester, in his "Medical and Philosophical Eſsays," has recorded a melancholy proof of the poisonous quality of Yew leaves. "On Friday, March 25, 1774, three children of James Buckley, a labouring man at Longsight, near Manchester, were killed by taking a small quantity of the fresh leaves of the Yew-tree, or *Taxus Officinalis* of Caspar Bauhine. The oldest child was five, the second four, and the youngest three years of age: They were all supposed to be infected with the worms, and this poison was given them by the recommendation of some ignorant

BOOK I. on it, but as long as the tree itself lasted; to which the people went in pilgrimage, plucking and bearing away branches of it, as an holy relique, whilst there remained any of the trunk; persuading themselves, that those small fine veins and filaments (resembling hairs between the bark and the body of the tree) were the hairs of the virgin: But what is yet stranger, the resort to this place, (then called Houton, a despicable village,) occasioned the building of the now famous town of Halifax, in Yorkshire, which imports *Holy Hair*. By this, and the like, may we estimate what a world of impostures have, through craft and superstition, gained the repute of holy places, abounding with rich oblations (their Devotas). Pliny speaks of an old Lotus tree in a grove near Rome, upon which the Vestals (as our Nuns) were used to hang their hair cut off at their profeſsion. Lib. xvi. cap. xlvi.

I may not in the mean time omit what has been said of the true Taxus of the antients, for being a mortiferous plant. Dr. Belluccio, President of the Medical Garden at Pisa in Tuscany, (where they have this curiosity,) affirms, that when his gardeners clip it, as sometimes they do, they are not able to work above half an hour at a time, it makes their heads so ache. The leaves of this tree are more like the Fir; it is very bushy, and furnished with leaves from the very root, seeming rather an hedge than a tree, though it grows very tall.

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person, as a powerful remedy for that disorder. The *dried leaves* were first employed; and a spoonful of them, mixed with brown sugar, was divided into three equal doses, which the children took at seven o'clock in the evening. At eight they had each a meſs of pottage, prepared of butter-milk, which, having been kept several days, was become very sour. No complaints were made by the children; nor did any bad effects ensue. Two days afterwards the mother collected *fresh leaves*, and administered them in the same dose, as before, and at the same hour. At eight o'clock the children breakfasted on nettle-pottage, that is, oatmeal gruel with fresh nettles boiled in it, a meſs well known in this country. At nine, they began to be uneasy; were chilly and listleſs; yawned much; and frequently stretched out their limbs. The oldest vomited a little, and complained of gripings in his belly; but the others expreſsed no signs of pains. The second child died at ten o'clock; the youngest about one; and the oldest at three in the afternoon. No agonies accompanied their diſsolution; no swelling of the abdomen ensued; and after death they had the appearance of being in a placid sleep. These particulars I learned from the unfortunate parents of the children, whose ignorance led them too long, and too fatally, to rely on the trifling and inefficacious means of relief, "suggested to them by their neighbours." Vol. iii.

The Holly Tree.

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J. Miller del & sc

This English Yew-tree is easily produced of the seeds, washed and cleansed from their mucilage, then buried and dried in sand a little moist, any time in December, and so kept in some vefsel in the house all winter, and in some cool shady place abroad all the summer; sow them the spring after. Some bury them in the ground like Haws; it will commonly be the second winter before they peep, and then they rise with their caps on their heads. Being three years old, you may transplant them, and form them into standards, knobs, walks, hedges, &c. in all which works they succeed marvellous well, and are worth our patience for their perennial verdure and durableneſs. I do again name them for hedges preferable, for beauty and a stiff defence, to any plant I have ever seen, and may, upon that account, without vanity, be said to have been the first who brought it into fashion, as well for defence, as for a succedaneum to Cypreſs, whether in hedges or pyramids, conic spires, bowls, or what other shapes, adorning the parks or larger avenues with their lofty tops, thirty feet high, and braving all the efforts of the most rigid winter, which Cypreſs cannot weather. I have said how long lasting they are, and easily to be shaped and clipped; nay, when cut down, they thrive: But those which are most superannuated, and perhaps of many hundred years standing, perish if so used.

HOLLY[n].

Above all the natural greens which inrich our home-born store, there is none certainly to be compared to the Agrifolium, (or Acuifolium rather)

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[n] Of the ILEX there are five species, but I shall only take notice of two:

1. ILEX *(AQUIFOLIUM)* foliis ovatis acutis spinosis. Lin. Sp. Pl. 181. Ilex aculeata baccifera. C. B. P. 425. *Prickly berry-bearing Ilex.* *THE COMMON HOLLY.*

The common HOLLY grows naturally in woods and forests in many parts of England, where it rises from twenty to thirty feet high, and sometimes more, but the ordinary height is not above twenty-five feet. The stem by age becomes large, and is covered with a greyish smooth bark; and those trees, which are not lopped or browsed by cattle, are commonly furnished with branches the greatest part of their length, so form a sort of cone; the branches are garnished with oblong oval leaves about three inches long, and one and a half broad, of a lucid green on their upper surface, but pale on their under, having a strong midrib: the edges are indented and waved, with sharp thorns terminating each of the points, so that some of the thorns are raised upward and others are bent downward; these being very stiff cannot be handled without pain. The leaves are placed alternate on every

BOOK I. our Holly, spontaneously growing here in this part of Surrey, that the large Vale near my own dwelling was antiently called Holmes-Dale, famous for the flight of the Danes: The inhabitants (of great antiquity in their manners, habits, and speech) have a proverb, *Holmes-*

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side of the branches, and from the base of their foot-stalks the flowers come out in clusters, standing on very short foot-stalks; each of these sustain five, six or more flowers. These flowers are of a dirty white, and appear in May; they are succeeded by roundish berries, which turn to a beautiful red about Michaelmas, and continue on the trees till after Christmas. Of the common Holly there are several varieties with variegated leaves, which are propagated by the nursery-gardeners for sale, but at present are little regarded, the old taste of filling gardens with shorn evergreens being entirely abolished; however, in the disposition of the clumps or other plantations of evergreen trees and shrubs, a few of the most lively colours may be admitted, which will have a good effect in the winter season, if shey are properly disposed. As the different variegations of the leaves of Hollies, are by the nursery gardeners distinguished by different titles, I shall here mention the most beautiful of them by their common names.

Fair Phillis. Chohole. Milkmaid. Chimney-sweeper. Glory of the East. Glory of the West. Painted Lady. Fuller's Cream Holly. Broderick's Holly. Cheney's Holly. Partridge's Holly. Wise's Holly. Ellis's Holly. Gray's Holly. Longstaff's Holly. Bradley's best Holly. Blotched Yellow-berried Holly. Mason's Copper-coloured Holly.—Bench's Ninepenny Holly. Pritchet's Holly. Blind's Cream Holly. Sir Thomas Frankland's Holly. Britain's Holly. Bradley's Long-leaved Holly. Whitmell's Holly. Bradley's Yellow Holly. Bridgman's Holly. Wells's Holly. Glafs's Holly. Bagshot's Holly. Brownrig's Holly. Hertfordshire White Holly. Common Blotched Holly. Yellow Blotched Hedge-Hog Holly. Silver Hedge-Hog Holly. Langton Holly.

2. ILEX *(CAROLINIANA)* foliis ovato-lanceolatis serratis. Lin. Sp. Pl. 181. *Holly with oval, spear-shaped, sawed leaves.* Aquifolium Caroliniense, foliis dentatis, baccis rubris—Catesb. Carol. I. p. 31. *Carolina Holly with indented leaves and red berries.* Commonly called *DAHOON HOLLY.*

This species of Holly grows naturally in Carolina, from whence the seeds were sent by the late Mr. Mark Catesby, who found the trees growing on a swamp at a distance from Charles-Town, but it hath since been discovered in some other parts in North-America. This rises with an upright branching stem to the height of eighteen or twenty feet; the bark of the old stem is of a brown colour, but that of the branches, or younger stalks, is green and smooth, garnished with spear-shaped leaves, which are more than four inches long, and one and a quarter broad in the broadest part, of a light green and thick consistence; the upper part of the leaves are sawed on their edges, each serrature ending in a small sharp spine; they stand alternately on every side the branches, upon very short foot-stalks. The flowers come out in thick clusters from the side of the stalks; they are white, and shaped like those of the common Holly, but are smaller; the female and hermaphrodite flowers are succeeded by small roundish berries in its native country, which makes a fine appearance in winter, but they have not as yet produced fruit in England. This plant is tender, and requires a warm exposure.

Dale never won; ne, never shall. It had once a fort called Holmes-Dale Castle: I know not whether it might not be that of Rygate; but leaving this uncertain, I return to the plant. I have often wondered at our curiosity after foreign plants, and expensive difficulties, to the neglect CH. XXI.

The ILEX is of the class and order *Tetrandria Tetragynia.*

The manner of propagating the Holly is nearly the same as the Yew; only as the plants never appear until the second spring, instead of sowing the berries immediately, as was directed for the Yew, they may be buried in the ground, then taken up, and sown the autumn following: If the berries are sown as soon as they are gathered, they will undoubtedly come up the spring twelvemonth after; and this would be the most eligible, as well as the surest way of obtaining a crop, could we be certain of guarding them from mice during so long a space of time; for these animals, when once they find out the seeds, will effectually destroy a whole seminary. If the planter is not averse to run this hazard, the best method will be to sow the seeds soon after they are ripe. During the following summer, the beds must be kept clean of weeds, and, if the season should prove dry, it would assist the growth of the seeds to give them now and then a gentle watering. These precautions being observed, the plants will come up in the second spring.

In the seed-bed the plants should remain two years, after which they should be transplanted in the autumn into beds properly prepared, at the distance of eight inches each way. Here they may stand two years longer, during which time they must be constantly kept clean from weeds; and if the plants have thriven well, they will be strong enough to transplant where they are designed to remain; for when they are transplanted at that age, there will be less danger of their failing, and they will grow to a larger size than those which are removed when they are much larger; but if the ground is not ready to receive them at that time, they should be transplanted into the nursery, in rows at two feet distance, and one foot asunder in the rows, in which place the plants may remain two years longer; and if they are designed to be grafted or budded with any of the variegated kinds, the operation should be performed after the plants are grown one year in the nursery; but the plants so budded or grafted should continue two years after in the nursery, that they may make good shoots before they are removed; though the plain ones should not stand longer than two years in the nursery, because when they are older they do not transplant so well. The best time for removing Hollies is early in the autumn, especially in dry land; but where the soil is cold or moist, they may be transplanted with great safety in the spring.

The Holly is an excellent plant for hedges, and would claim the preference to the Hawthorn, were it not for the slowness of its growth while young, and the difficulty of transplanting it, when grown to a moderate size. It will grow best in cold stony land, where, if once it takes well, the hedges may be rendered so close and thick as to keep out all sorts of animals. These hedges may be raised by sowing the berries in the place where they are designed to remain, or by plants of three or four years growth; but as the berries continue in the ground near eighteen months before the plants appear, few persons

BOOK I. of the culture of this vulgar, but incomparable tree, whether we propagate it for use and defence, or for sight and ornament·

——Mala furta hominum densis mucronibus arcens
Securum defendit inexpugnabilis hortum,
Exornatque simul, toto spectabilis anno,
Et numero et viridi foliorum luce nitentûm. COULEII PL. lib. vi.

A hedge of Holly, thieves that would invade,
Repulses like a growing palisade;
Whose numerous leaves such orient greens invest,
As in deep winter do the spring arrest.

Which makes me wonder why it should be reckoned among the unfortunate trees by Macrobius, Sat. lib. ii. cap. xvi. and by others among the lucky; for so it seems they used to send branches of it, as well as of Oak, (the most fortunate, according to the Gentile Theology) with their Strenæ, (New-Year's Gifts) begun, as Symachus tells us, by King Tatius, almost as old as Rome herself.

But to say no more of these superstitious fopperies, which are many, about this tree, we still dreſs up both our churches and houses, on Christmas and other festival days, with this cheerful green, and its rutilant berries.

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care to wait so long; therefore the usual and best method is to plant the hedges with plants of the before-mentioned age. But where this is practised, they should be transplanted either early in the autumn, or deferred till toward the end of March; then the surface of the ground should be covered with mulch near their roots after they are planted, to keep the earth moist; and if the season should prove dry, the plants should be watered at least once a week, until they have taken root, otherwise they will be in danger of miscarrying; for which reason the autumnal planting is generally preferred to the spring, especially in dry grounds. Columella's description of a good hedge is highly applicable to one made of Holly. "Neu sit pecori, neu pervia furi." Of the rind of this tree birdlime is made:

"Alas! in vain with warmth and food
"You cheer the Songsters of the wood;
"The barbarous boy from you prepares
"On treacherous twigs his viscous snares:
"Yes, the poor bird you nurs'd shall find
"Destruction in your rifled rind."

Is there under heaven a more glorious and refreshing object of the kind, than an impregnable hedge of about four hundred feet in length, nine feet high, and five in diameter, which I can show in my now ruined gardens at Say's Court, (thanks to the Czar of Muscovy°,) at any time of the year, glittering with its armed and varnished leaves? The taller standards at orderly distances, blushing with their natural coral: It mocks the rudest aſsaults of the weather, beasts, or hedge-breakers,

Et illum nemo impunè lacesſit.

It is with us of two eminent kinds, the prickly and smoother leaved; or, as some term it, the Free Holly, not unwelcome, when tender, to sheep and other cattle. There is also of the White-berried, and a Golden and Silver, variegated in six or seven differences, which proceeds from no difference in the species, but accidentally, and naturæ lusu, as most such variegations do: since we are taught how to effect it artificially, namely, by sowing the seeds, and planting in gravelly soil, mixed with store of chalk, and preſsing it hard down; it being certain that they return to their native colour when sown in richer mould, and that all the fibres of the roots recover their natural food.

I have already showed how it is to be raised of the berries, (of which there is a sort bears them yellow, and propagate their colour,) when they are ready to drop: this only omitted, that they should first be freed from their tenacious and glutinous mucilage, by being washed, and a little bruised, then dried with a cloth, or else bury them as you do the Yew and Hips: and let the Forester receive this for no common secret, and take notice of the effect. If you will sow them in the berry, keep them in dry sand till March, remove them also after three or four years; but if you plant the sets, (which is likewise a commendable way, and the woods will furnish enough,) place them northwards, as they do Quick: With this, living pales and enclosures may be made, and when cut into square hedges, it becomes an impenetrable fence that will thrive in the hottest as well as the coldest places. The Right Honourable my Lord Dacres, as I am credibly informed, has a park somewhere in Suſsex,

° The Czar Peter the Great resided at Mr. Evelyn's house, in order that he might be near the yard at Deptford during his stay in England.

BOOK I.

environed with a hedge of Holly able to keep in any game. I have seen hedges, or, if you will, stout walls of Holly twenty feet in height, kept upright, and the gilded sort budded low, and in two or three places one above another, shorn and fashioned into columns and pilasters, architectonially shaped, and at due distance; than which nothing can pofsibly be more pleasant, the berry adorning the intercolumniations with scarlet festoons and Encarpa. Of this noble tree one may take thousands of them, four inches long, out of the woods, (growing amongst the fallen leaves) and so plant them; but this should be before the cattle begin to crop them, especially sheep, who are greedy of them when tender: Stick them into the ground in a moist season, in spring or early in autumn, especially the spring, shaded (if it prove too hot and scorching) till they begin to shoot of themselves, and in very sharp weather, and during our Eastern Etesians, covered with dry straw or haume; and if any of them seem to perish, cut it close, and you shall soon see it revive. Of these seedlings, and by this culture, I have raised plants and hedges full four feet high in four years: The lustier and bigger the sets are, the better; and if you can procure such as are a thumb's breadth thick, they will soon furnish into an hedge. At Dungenefs, in Kent, they grow naturally amongst the pebbles upon the very beach; but if your ground be stiff, loosen it with a little fine gravel: This rare hedge, the boast of my villa, was planted upon a burning gravel, exposed to the meridian sun; for it refuses not almost any sort of barren ground, hot or cold, and often indicates where coals are to be dug.

True it is, that time must bring this tree to perfection; it does so to all things else, *et posteritati pangimus*. But what if a little culture about the roots, (not dunging, which it abhors,) and frequent stirring of the mould, double its growth? We stay seven years for a tolerable Quick; it is worth staying thrice seven for this, which has no competitor.

And yet there is an expedient to effect it more insensibly, by planting it with the Quick: Let every fifth or sixth be a Holly-set; they will grow up infallibly with your Quick, and as they begin to spread, make way for them by extirpating the White-Thorn, till they quite domineer: Thus was my hedge first planted, without the least interruption to the fence, by a most pleasant metamorphosis. But there is also another, not lefs applauded, by laying along well-rooted sets, a yard or more in length,

and stripping off the leaves and branches, letting only something of the tops appear: These, covered with a competent depth of earth, will send forth innumerable suckers, which will suddenly advance into an hedge that will grow as well under the shade as sun, provided you keep it weeded, and now and then loosen the earth; towards which, if through extreme neglect, or other accident, it grow thin, being close cut down it will fill and become stronger and thicker than ever.

Of this stately shrub, as some reckon it, there is lately found an Holly, whose leaves are as thorny and bristly, not only at the edges, but all over as an hedge-hog, which it may properly be called; and I think was first brought by Mr. London out of France.

The timber of the Holly (besides that it is the whitest of all hard woods, and therefore used by the inlayer, especially under thin plates of ivory, to render it more conspicuous) is for all sturdy uses; the mill-wright, turner, and engraver prefer it to any other: It makes the best handles and stocks for tools, flails, the best riding-rods, and carters' whips; bowls, chivers, and pins for blocks: Also it excels for door-bars and bolts; and as of the Elm, so of this especially, they made even hinges and hooks to serve instead of iron, sinking in the water like it; and of the bark is composed our bird-lime, thus:

Peel a good quantity of the bark about Midsummer; fill a veſsel with it, and put to it spring-water; then boil it till the gray and white bark rise from the green, which will require near twelve hours boiling; then taking it off the fire, separate the barks, the water first well poured off. Then lay the green bark on the earth, in some cool vault or cellar, covering it with any sort of green and rank weeds, such as Dock, Thistles, Hemlock, &c. to a good thickneſs; thus let it continue near a fortnight, by which time it will become a perfect mucilage; then pound it all exceedingly in a stone mortar, till it be a tough paste, and so very fine as no part of the bark be discernible: This done, wash it accurately well in some running stream of water, as long as you perceive the least ordure or motes in it, and so reserve it in some earthen pot, to purge and ferment, scumming as often as any thing arises for four or five days, and when no more filth comes, change it into a fresh veſsel of earth, and reserve it for use, thus: Take what quantity you please of it, and in an earthen pipkin

BOOK I.

add a third part of capon or goose-grease to it, well clarified, or oil of Walnuts, which is better; after incorporating the mixture on a gentle fire, keep stirring it till it be cold, and thus your composition is finished. But to prevent frosts, (which, in severe weather, will sometimes invade it on the rods,) take a quarter of as much oil of Petroleum as you do of grease, and no cold whatever will congeal it. The Italians make their Viſchio of the berries of the misleto of trees, (and indeed it is from this it is said of the thrush, *Exitium suum cacat*, that bird being an exceeding devourer of them,) treated much after the same manner; but then they mix it with nut-oil, an ounce to a pound of lime, and taking it from the fire, add half an ounce of turpentine, which qualifies it also for the water. Great quantities of bird-lime are brought to us out of Turkey, and from Damascus, which some conceive to be made of Sebestens, finding sometimes the kernels. This lime is of a greener colour, subject to frosts, and impatient of wet, nor will last above a year or two good. Another sort comes also out of Syria, of a yellow hue; likewise from Spain, whiter than the rest, which will resist the water, but is of an ill scent. I have been told that the Cortex of our Lantana, or Wayfaring Shrub, will make as good bird-lime as the best. But let these suffice, being more than as yet any one has published. The superior leaves of Holly-trees, dried to a fine powder and drank in white wine, are prevalent against the stone, and cure fluxes; and a dozen of the mature berries, being swallowed, purge phlegm without danger: To which the learned Mr. Ray (in Append. Plant. Angl.) adds a zythogalum, or poſset, made of milk and beer, in which is boiled some of the most pointed leaves, for aſsuaging the torment of the cholic, when nothing else has prevailed.

CORNUS [p].

The Cornel tree, though not mentioned by Pliny for its timber, is exceedingly commended for its durableneſs and use in wheel-work, pins,

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[p] This is the CORNUS *(mas)* arborea, umbellis involucrum æquantibus. Lin. Sp. Pl. 171. *Tree Dogwood with umbels equal to the involucrum.* Cornus sylvestris mas. C. B. P. 447. *Male cornel, or cornelian cherry-tree.*

As the fruit of this tree is not at present much esteemed, the nursery-men about London propagate it as one of the sorts which is commonly sold as a flowering shrub, and is by some people valued for coming so early to flower: for if the season be mild, the flowers will appear

and wedges, in which it lasts like the hardest iron; it will grow with us to good bulk and stature. The preserved and pickled berries (or Cherries rather) are most refreshing, an excellent condiment, and do also well in tarts. But it is very odd what Mathiolus affirms upon his own experience, that one who has been bitten of a mad dog, if in a year after he handle the wood of this tree till it grows warm, relapses again into his former distemper.

The same is reported of the Cornus Fæmina, or Wild Cornel, which like the former is noted for compactneſs, and made use of for cart-timber, and other rustick instruments; it also makes the best of butchers' ſkewers, and tooth-pickers. In some countries abroad they decoct the berries, which preſsed, yield an oil for the lamp.

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by the beginning of February; and though there is no great beauty in the flowers, yet, as they are generally produced in plenty, at a season when few other flowers appear upon trees, a few plants may be admitted for variety. The fruit of this tree is seldom ripe before September. The tree will grow to the height of eighteen or twenty feet, forming a large head.

This Tree is of the claſs and order *Tetrandria Monogynia*.

The CORNELIAN CHERRY-TREE should be raised from seeds. These should be sown in the autumn, soon after they are ripe, or they will not come up till the second spring; and sometimes, when the intermediate summer has proved very dry, they will not appear till the summer after; so that great care should be used to get the seeds into the beds as soon as poſsible; but if the work cannot be done before the spring, and the plants do not come up, the beds should be left undisturbed for the two following seasons.

When the plants have made their appearance, they should stand in the seed-bed a year or two to acquire strength; during which time they should be kept clean of weeds, and in dry weather watered. After this, they should be planted out in the nursery, in rows, where they may remain, with the usual care, till they are fit to be planted out for good; the best season for which is the autumn.

The Cornelian Cherry-tree is a native of Miſnia, Austria, and some other places, but grows very well with us; and may be planted with succeſs on moist soils.

Homer ranks the Cornel amongst the trees that afford the coarsest food:

> Mean time the Goddeſs in disdain bestows
> The Mast and Acorn, brutal food! and strows
> The fruit of Cornel, as they feast around. ODYSSEY.

The wood of this tree was used by the antients for Javelins—"volat Itala Cornus."

BOX[q].

BUXUS. The BOX. This we begin to proscribe our gardens, (and indeed bees are no friend to it) though it should not yet be banished from our care, because the excellency of the wood does commute for the disagreeableneſs of its smell: Therefore let us furnish our cold and barren hills and declivities with this useful shrub, I mean the taller sort; for dwarf and more tonsil in due place. It will increase abundantly of slips set in March, and towards Bartholomew-tide, as also of the seeds contained in the cells. These trees rise naturally at Boxley in Kent, and in the county of Surrey, giving name to that chalky hill, (near the famous Mole or Swallow,) whither the ladies, gentlemen, and other water-drinkers from the neighbouring Ebesham Spaw, often resort during the heat of summer, to walk, collation, and divert themselves in the natural alleys and shady receſses, among the Box-trees, without taking any such offence at the smell which has of late banished it from our groves and gardens; when, after all, it is infinitely to be preferred for the bordering of flower-beds and flat embroideries, to any sweeter leſs-

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[q] Of this Tree there is only one species, which in the Sp. Pl. stands simply with the name BUXUS. There are, however, many varieties, such as,

1. The Broad-leaved Box.
2. The Dwarf, commonly called the Dutch Box.
3. The Narrow-leaved Box.
4. The Gold-striped Box.
5. The Silver-striped Box.
6. The Gold-edged Box.
7. The Curled-leaved striped Box.

The kind recommended for a forest-tree is the broad-leaved; but of all the sorts, the narrow-leaved is by far the most beautiful. The striped sorts are only the common Box variegated.

The BOX is of the claſs and order *Monoecia Tetrandria*.

The BOX TREE is propagated by layers planted any time between Michaelmas and March; or by cuttings put down in autumn, and kept watered till they have struck root. It may also be raised from seeds sown soon after they are ripe in a shady border, and well watered in dry weather. The Dwarf Box, for edgings, is propagated by dividing the plants into as many parts as are furnished with roots.

This tree grows luxuriantly, and in great abundance, upon Box-hill, at Darking in Surrey, which place may be said to rival Virgil's Cytorus:

Et juvat undantem buxo spectare Cytorum. GEORG. ii.

lasting shrub whatever, subject, after a year or two, to grow dry, sticky, and full of gaps; which Box is so little obnoxious to, that, braving all seasons, it needs not to be renewed for twenty years together, nor kept in order with the garden sheers above once or twice a year; and immediately upon that, the casting water upon it, hinders all those offensive emiſsions which some complain of. But whilst I speak in favour of this sort of edging, I only recommend the use of the Dutch Box, (rarely found growing in England,) which is a pumil dwarf kind, with a smaller leaf, and slow of growth, and which needs not be kept above two inches high, and yet grows so close, that beds bordered with boards keep not the earth in better order; beside, the pleasantneſs of the verdure is incomparable.

One thing more I think fit to add; that it may be convenient once in four, five, or six years, to cut off the strings and roots which straggle into the borders, with a very sharp spade, that they may not prejudice the flowers, and what else one plants in them.

I need not speak much of the uses of this tree, (growing in time to considerable stature,) so continually sought after for many utensils, being

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The Box tree makes a fine and cheerful appearance in Evergreen quarters, and when cut down, the wood sells at a high price; a sufficient encouragement for the planter to raise it for sale. The English wood, however, is inferior to that which comes from Turkey. The American Box is also preferable to ours.

This beautiful Evergreen was much esteemed by the antients, for use as well as ornament. They made combs of it as we do at this day:

Multifido Buxus quæ tibi dente datur. MART.

They also formed it into musical instruments to be played upon by the mouth:

Si buxos inflare juvat———— CLAUD.

————non illos carmina vocum,
Longave multifori delectat tibia *buxi*. OVID.

————Cum sacra vocant, Idæaque suadet Buxus. STATIUS.

Among the Romans, these trees were clipped into a variety of forms, a practice quite exploded by our modern improvers in gardening. Pliny, the Consul, in his letter to Apollinaris, on the subject of his Tuscan Villa, minutely describes his garden, in which the Box clipped into a variety of figures, was a principal ornament. This is the only regular account that we have of a Roman garden, which does not seem to differ materially from the English gardens of the last century.

BOOK I.

so hard, close, and ponderous as to sink, like lead, in water; and therefore of special use for the turner, engraver, carver, mathematical instrument-maker, comb, and pipe-maker, *(Si buxos inflare juvat*—Claud.) who give great prices for it by weight, as well as measure; and by the seasoning, and divers manner of cutting, vigorous insolations, politure and grinding, the roots of this tree (as of even our common and neglected thorn) do furnish the inlayer and cabinet-maker with pieces rarely undulated, and full of variety: Also of Box are made wheels or shivers, as our ship-carpenters call them, and pins for blocks and pulleys; pegs for musical instruments; nut-crackers, weavers' shuttles, hollar-sticks, bump-sticks, and dreſsers for the shoemaker, rulers, rolling-pins, pestles, mall-balls, beetles, tops, tables, cheſs-men, screws, male and female, bobins for bone-lace, spoons, nay the stoutest axle-trees; but above all,

——————————non ultima belli
Arma Puellaris; Laqueos hæc nectic Amantûm,
Et venatricis disponit retia Formæ. COULEII. Pl. Lib. vi.

————Box combs bear no small part
In the militia of the female art;
They tie the links which hold our gallants fast,
And spread the nets to which fond lovers haste.

The chemical oil of this wood has done the feats of the best guaiacum (though in greater quantity) for the cure of venereal diseases, as one of the most expert Physicians in Europe has confeſsed. The oil aſsuages the tooth-ache. But, says Rhodoginus, the honey which is made at Trebisond in Box-trees (I suppose he means gathered among them; for there are few, I believe, if any, so large and hollow as to lodge and hive bees,) renders them distracted who eat of it. Lib. xxiii. cap. xxv.

He that in winter should behold some of our highest hills in Surrey clad with whole woods of these trees, for divers miles in circuit, (as in those delicious groves of them belonging to the Honourable, my Noble Friend, the late Sir Adam Brown, of Beachworth Castle,) might, without the least violence to his imagination, easily fancy himself transported into some new or enchanted country; for, if in any spot of England,

Hic ver aſsiduum, atque alienis mensibus æstas. VIRG.

——————————'tis here
Eternal spring and summer all the year.

The Scotch Fir Tree.

J. Miller del. & sc.

Publish'd Jan.y 1st 1803 by A. Hunter M.D. as the Act directs.

CHAP. XXII.

The FIR[r], PINE, PINASTER, PITCH-TREE, and LARCH.

1. ABIES, PICEA, PINUS, PINASTER, and LARCH, are all of them easily raised of the kernels and nuts, which may be gotten out of their polysperm and turbinate cones, clogs, and squams, by exposing them to the sun, or a little before the fire, or in warm water, till they begin to gape, and are ready to deliver themselves of their numerous burdens.

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[r] Of this GENUS there are various species:

1. PINUS *(SYLVESTRIS)* foliis geminis; primordialibus solitariis glabris. Lin. Sp. Pl. 1418. *Pine-tree with two leaves in each sheath, but the first leaves smooth and single.* Pinus Sylvestris C. B. P. 491. *THE WILD PINE, or SCOTCH FIR.*

This is called the Scotch Fir, because it grows naturally on the Highlands of Scotland, where the seeds, falling from their cones, come up and propagate themselves without any care. But it is not in Scotland only that these trees thrive naturally; for they grow spontaneously in Denmark, Norway, and Sweden. And though, from the above instances, it would seem that they delighted principally in these northern parts; yet when the plants are properly raised and planted out, no climate comes amiss to them, for they will thrive and grow to be good timber-trees in almost any part of the temperate globe. The timber of this tree is what we call Deal, which is sometimes red, sometimes yellow, but chiefly white. The Pinaster is a variety of this species, and is titled Pinaster Latifolius, julis virescentibus sive pallescentibus. This tree throws out large arms, and its leaves are larger and longer, and of a paler green than those of the Scotch Fir. It is a native of Italy, though it abounds in the south of France; and in Switzerland, where there are great plenty of these trees, the inhabitants cut them into shingles for the covering of their houses, which soon become so compact and close, by the sun's melting the resinous substance, as to be proof against all weather. There are two other varieties; Pinus maritima altera; and Pinaster tenuifolius, julo purpurascente. Bauh. Pin. The white inner rind of this tree, when dried and ground in a mill, is used by the inhabitants of some northern countries as a substitute for flour, which, after undergoing a particular operation, is converted into bread.

2. PINUS *(STROBUS)* foliis quinis margine scabris, cortice lævi. Lin. Sp. Pl. 1419. Pinus Canadensis quinquefolia, floribus albis, conis oblongis pendulis, squamis abieti fere similibus. Duham. Arb. 2. p. 127. Pinus Virginiana, conis longis non ut in vulgari echinatis. Pluk. Alm. 297. *THE WEYMOUTH PINE.*

BOOK I.

FIR.

2. There are of the Fir two principal species; the Picea, or Male, which is the bigger tree, very beautiful and aspiring, and of an harder wood, and hirsute leaf; and the Silver Fir, or Female. I begin with the first: The boughs whereof are flexible and bending; the cones dependent, long and smooth, growing from the top to the branch; and where gaping, yet retain the seeds in their receptacles, when fresh

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This grows naturally in most parts of North America, where it is called the White or Masting Pine, and is one of the tallest trees of all the species; often growing a hundred feet high in these countries. Of this tree the best masts are made, and Dr. Douglas, in his "Historical and Political Summary of the British Settlements in North America," says, that upon the banks of the river Merrimack, in the year 1736, there was cut a White Pine that was seven feet eight inches in diameter at the but-end. The bark of this tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of each sheath; the branches are pretty closely garnished with them, so make a fine appearance; the cones are long, slender, and very loose, opening with the first warmth of the spring, so that if they are not gathered in winter, the scales open and let out the seeds. As the wood of this tree was generally thought of great service to the navy, there was a law made in the ninth year of Queen Ann for the preservation of the trees, and to encourage their growth in America; it is not much above half a century since these trees began to be propagated in England in any plenty, though there were some large trees of this sort growing in two or three places long before, particularly at Lord Weymouth's, and Sir Wyndham Knatchbull's in Kent; and it has been chiefly from the seeds of the latter that the greatest number of these trees now in England have been raised; for although there has annually been some of the seeds brought from America, yet these have been few in comparison to the produce of the trees in Kent; and many of the trees which have been raised from the seeds of those, now produce plenty of good seeds, particularly the trees in the gardens of his Grace the Duke of Argyll at Whitton, which annually produce large quantities of cones. This sort and the Scotch Pine are the best worth cultivating of all the kinds for the sake of their wood; the others may be planted for variety in parks, &c. where they make a good appearance in winter, when other trees are destitute of leaves.

3. PINUS *(PINEA)* foliis geminis; primordialibus solitariis ciliatis. Lin. Sp. Pl. 1419. *Pine-tree with two leaves coming out of each sheath, and the first leaves single.* Pinus sativa. C. B. P. 490. *The cultivated Pine-tree*, commonly called *THE STONE PINE.*

The Stone Pine is a tree of which there should be a few in all plantations of ever-greens. It will grow to a considerable height, and arises with a straight and fair stem, though with a rough bark. The leaves contribute to the diversifying of the scene, as they differ in colour from the other sorts, and are arranged in a different manner. The cones which it bears are large and turbinated; they strike the eye by their bold appearance when hanging on the trees, and when closely examined, exhibit a beautiful arrangement of scales. They produce a kernel as sweet to the taste as an Almond, with a slight flavour of the turpentine. This tree is a native of Italy, where the kernels are served up in deserts at the tab'; they were formerly kept in the shops, and thought to be salutary in colds, coughs, and consumptions. The Stone Pine may be sawed into good boards, though the timber is generally allowed not to be

The Weymouth Pine Tree.

Published June 1st 1770 by A. Hunter M. D. as the Act directs.

F. Miller del. & sculp.

gathered, giving a grateful fragrancy of the rosin: The fruit is ripe in September. But after all, for a perfecter account, the true and genuine Fir-tree is a noble upright tree from the ground, smooth and even to the eruption of the branches, which they call the sapinum, and thence tapering to the summit of the fusterna: The arms and branches, with Yew-like leaves, grow from the stem opposite to one another, seriatim to the top, CH. XXII.

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quite so valuable as the other sorts. The colour is not the same in all trees; some exhibiting their timber of a very white colour; others again are yellower, and smell stronger of the turpentine. Martial represents it as dangerous to stand under this species of Pine, on account of the magnitude of its cones:

Poma sumus Cybeles; procul hinc discede, viator,
Ne cadat in miserum nostra ruina caput. Lib. xiii. Ep. 25.

4. PINUS *(TÆDA)* foliis trinis. Lin. Sp. Pl. 1419. Pinus Virginiana tenuifolia tripilis s. ternis plerumque ex uno foliculo setis, strobilis majoribus. Pluk. Alm. 297. *Virginian Pine-tree, with three narrow leaves in each sheath, and larger cones.* THE SWAMP PINE-TREE.

This is a very large growing tree, and is highly proper, as its name imports, to be planted in moist places. The leaves are long, and of a delightful green colour; three issue out of each sheath, and adorn the younger branches in great plenty. Its propagation is the same as the Weymouth Pine; and the planting out, and after-management is exactly similar. It will grow on upland and dry grounds; but it chiefly delights in moist places.

5. PINUS *(CEMBRA)* foliis quinis lævibus. Lin. Sp. Pl. 1419. Laryx sempervirens, foliis quinis, nucleis edulibus. Breyn. E. N. C. Cent. 7. Obs. 2. Pinus Sylvestris Cembra. Cam. Epit. 42. THE CEMBRA PINE.

The Cembra Pine is a fine tree; the leaves are very beautiful, being of a lighter green than moſt of the Pines, and are produced five in a sheath. They are long and narrow; and as they closely ornament the branches all round, they render the tree on that account very desirable. The cones also have a good effect; for they are larger than those of the Pinaſter, and the squamæ are beautifully arranged. This tree is a native of the Alps, and is well described by Mr. Harte, in his elegant Eſsays in Husbandry, under the title of *Aphernousli* Pine. He considers it as a tree likely to thrive with great advantage on our bleak, barren, rocky, and mountainous lands; even near the sea, and in north, or north-east aspects, where something of this hardy kind is much wanted. The timber is large and has many uses, especially within doors, or under cover. The bark of the trunk is not reddish like the bark of the Pine, but of a white cast like that of the Fir. The shell which incloses the kernel is easily cracked, and the kernels are covered with a brown skin which peels off. They are about the size of a common pea, triangular, like buck-wheat, and white as a blanched almond, of an oily agreeable taste, but leaving in the mouth *that* small degree of asperity which is peculiar to wild fruits, and not unpleasing. These kernels sometimes make a part in a Swiſs desert. Wainscotting, flooring, and other joiner's work, made with the planks of the Aphernousli, are of a finer grain, and more beautifully variegated than deal, and the smell of the wood is more agreeable. From this tree is extracted a white odoriferous resin. On this occa-

BOOK I. as do all cone-bearers, discovering their age; which in time, with their weight, bend them from their natural tendency, which is upright, especially toward the top of aged trees, where the leaf is flattish, and not so regular. The cone is great and hard, pyramidal, and full of winged seeds.

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sion the curious planter may consult a very scarce book, *De Arboribus Coniferis, Resiniferis, aliisque Sempiterna fronde Virentibus*, written about two hundred years ago, by Pietro Beloni. In the plantations belonging to Jeremiah Dixon, at Gledhow, near Leeds, may be seen several of these Pines. They are there called the Gledhow Pine.

6. PINUS *(PICEA)* foliis solitariis emarginatis. Lin. Sp. Pl. 1420. Abies taxi folio, fructu sursum spectante. Tourn. Inst. 585. Abies conis sursum spectantibus. s. mas. Bauh. Pin. 505. *THE SILVER FIR-TREE.*

This is a noble upright tree. The branches are not very numerous, but the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green colour, and their under has an ornament of two white lines, running length-ways on each side of the mid-rib, on account of which silvery look, this sort is called the Silver Fir. The cones are large, and grow erect; and when the warm weather comes on, they soon shed their seeds; which should caution us to gather the cones at an early season. This tree is common in the mountainous parts of Scotland, and in Norway, and affords the yellow deal. From its yielding pitch, it has obtained the title of *Picea*, or Pitch-tree.

7. PINUS *(ABIES)* foliis solitariis subulatis mucronatis lævibus bifariam versis. Lin. Sp. Pl. 1421. Abies foliis solitariis apice acuminatis. Hort. Cliff. 445. *THE SPRUCE FIR-TREE.*

The Spruce Fir is a beautiful tree, as well as a valuable one for its timber, producing the white deal. It is a native of Norway and Denmark, where it grows spontaneously, and is one of the principal productions of their woods. It also grows plentifully in the Highlands of Scotland, where it adorns those cloud-capped mountains with a constant verdure. The long-coned Cornish Fir is a variety of this tree, and differs scarcely in any respect, except that the leaves and cones are larger. The varieties of the Norway Spruce go by the names of Picea major prima, sive Abies rubra: Abies alba, sive fœmina.

8. PINUS *(CEDRUS)* foliis fasciculatis acutis. Lin. Sp. Pl. 1420. Cedrus Conifera, foliis Laricis. B. P. 490. Cedrus Libani. Bar. Ic. 499. *THE CEDAR OF LEBANON.*

This tree is now clafsed with the Pine; but as Mr. Evelyn has a separate chapter upon it, I shall, in this place, only give its botanical description.

9. PINUS *(BALSAMEA)* foliis solitariis subemarginatis: Subtus linea duplici punctata. Lin. Sp. Pl. 1421. *THE BALM OF GILEAD FIR.*

This beautiful tree is a native of North America. It rises with an upright stem, and its branches are garnished with solitary, flat, obtuse leaves, slightly emarginated at top, of a dark green

The Silver Fir Tree.

Publish'd Jan.y 1st 1770 by A. Hunter M.D. as the Act directs

J. Miller del.t & sc.

The Spruce Fir Tree.

Published Jan.ʳʸ 1803. by A. Hunter M.D. as the Act directs.

J. Miller del. & sc.

The Larch Tree.

Published Jan.ry 1st 1776 by J. Hunter, M.D. as the Act directs.

J. Miller del. & sc.

The Silver Fir, of a whitish colour, like Rosemary, under the leaf, is distinguished from the rest by the pectinal shape of it: The cones not so large as the Picea, grow also upright, and this they call the Female: For I find botanists not unanimously agreed about the sexes of trees. The layers, and even cuttings of this tree, take root, and improve to trees,

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colour on their upper surface, and marked with whitish lines underneath. The cones are roundish and small. The buds and leaves are remarkably fragrant, hence its name. From wounds made in this tree is obtained a very fine turpentine, which is sometimes sold in the shops for the true Balm of Gilead. It delights in a rich deep soil.

10. PINUS *(ORIENTALIS)* foliis solitariis tetragenis. Lin. Sp. Pl. 1421. Abies orientalis folio brevi et tetragono, fructu minimo deorsum inflexo. Tourn. *THE ORIENTAL FIR.*

This is a low, but elegant tree. The leaves are very short and nearly square. The cones hang downwards, and are exceedingly small.

PINUS *(LARIX)* foliis fasciculatis obtusis. Lin. Sp. Pl. 1420. Larix, folio deciduo, conifera. B. P. 1. p. 263. *THE LARCH-TREE.*

This tree is of quick growth, and will rise to the height of fifty feet; the branches are slender, and their ends generally hang downward. These are garnished with long, narrow leaves, which arise in clusters from one point, and spread open above like the hairs of a painter's brush; they are of a light green, and fall in autumn, like other deciduous trees. In the month of April the male flowers appear, which are disposed in form of small cones; the female flowers are collected into oval obtuse cones; these in some kinds have bright purple tops, and in others they are white. These differences however are accidental, as the seeds taken from either of the varieties will produce plants of both sorts. The cones are about one inch long, and obtuse at their points; the scales lie over each other, and are smooth; under each scale two winged seeds are generally lodged. The Larch is a native of the Alps and Appenine mountains, and is now very common in all the nurseries of this kingdom. It is remarked that those trees which have been planted in the worst soils, and most exposed situations, have thriven the best, which is a great encouragement. At Rufford, the seat of the late Sir George Savile, there are large plantations of Larch upon a blowing sand, in which situation they far outstrip every other kind of tree. Some trees cannot bear too great a luxuriancy, and the Larch, in particular, is apt to grow top-heavy from much shelter and nourishment: They should therefore be planted in clumps, and not as single trees; neither should the plants be taken from very warm nurseries, if intended to be placed out upon exposed situations, but rather raised as near the spot as possible, taking care that the soil be good. When they are intended to grow large, they should not exceed three or four years when planted; for though trees of a greater size will remove very well, yet experience has shown us that the youngest trees, with good roots, bear change of situation the best. The Larch is a tree as yet but little known in this kingdom; but there is great reason to apprehend that it will prove a very important acquisition to the planter. In Switzerland they cover the roofs of their houses with shingles made of Larch. These are generally cut about one foot square, and half an inch in thickness, which they nail to the rafters. At first the roof appears white, but in two or three years it becomes as black as coal, and all the joints are stopped by the resin which the sun extracts from the pores of the wood. This shining varnish renders the roof impenetrable

BOOK I. though more naturally by its winged seeds: But the masculine Picea will endure no amputation, nor is comparable to the Silver Fir for beauty, or so fit to adorn walks and avenues. Though the other also be a very stately plant, yet it has this infirmity, that though it remains always green, it sheds the old leaves more visibly, and not seldom breaks down its ponderous branches: Besides, the timber is nothing so white; though yet

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to wind or rain. It makes a cheap covering, and, as some say, an incombustible one; but that is rather doubtful. From this tree is extracted what we erroneously call *Venice Turpentine*. This substance, or natural balsam, flows at first without incision; when it has done dropping, the poor people, who wait on the Fir-woods, make incisions, at about two or three feet from the ground, into the trunk of the trees, and into these they fix narrow troughs, about twenty inches long. The end of these troughs is hollowed like a ladle; and in the middle is a small hole bored, for the turpentine to run into a receiver, which is placed below it. As the balsam runs from the trees, it passes along the sloping gutter, or trough, to the ladle, and from thence runs through the hole into the receiver. The people who gather it visit the trees morning and evening, from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, the turpentine is clear, and of a yellowish white; but, as it grows older, it thickens, and becomes of a citron colour. It is procured in greatest abundance in the neighbourhood of Lyons, and in the valley of St. Martin, near Lucern, in Switzerland. This tree, at an early age, makes durable posts and rails.

The scales of the Larch cones are so closely glewed together, that it is with the greatest difficulty we can separate them without bruising the seeds, which renders them unfit for vegetation. It is on this account that little good seed can be procured from the wholesale dealers. Mr. Speechly, gardener to his Grace the Duke of Portland, has communicated to me the following method of raising Seedling Larches, which at once obviates all the difficulties complained of, and secures to the planter a certain crop at a moderate expence.

"Let the cones be collected in the month of November, or beginning of December, and "when gathered, lay them in heaps about six inches thick, in a shady, but exposed situa- "tion, taking care that the heaps be not too large, which would occasion mouldiness. In "this manner let them be exposed to the weather till the beginning of May, which is the "properest season for laying them upon the beds, as there is not power in the sun before "that time to cause the cones to expand sufficiently. Then let beds of four feet in breadth "be prepared on ground newly dug; a rich, light, and sandy soil is the most proper. The "mould should be raked from the middle to the sides of the beds, so as to form a kind "of ridge on each side, to prevent the cones, or their seed, from falling into the alleys, "which should be two feet in breadth for the convenience of the weeders. The beds "being thus finished, the cones should be so disposed, that every part of the surface shall "be covered; and if a few cones are dispersed upon the others, the seeds will be shed "with greater certainty. If the weather comes warm and dry, the cones will soon "expand, so that it will be proper to examine the beds frequently, to see when a sufficient "quantity of seed is shed. The cones may then be removed to a second bed, prepared "in the same manner as the former; but before they are taken off it will be proper to give

even that colour be not always the best character: That which comes from Bergen, Swinsund, Mott, Langland, Dranton, &c. (which experienced workmen call the Dram,) being long, straight, and clear, of a yellow and more cedary colour, is esteemed much before the white for flooring and wainscot; for masts, &c. those of Prussia, which we call Spruce and Norway, especially from Gottenberg, and about Riga, are the

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" them a shake in a coarse sieve, which will occasion a considerable quantity of seed " to fall from them, especially if this operation be performed in the middle of the day, for " the morning and evening dews contract the cones, and prevent their parting with the " seed. As soon as the cones are removed from the beds, let the seed be covered with " a little fine mould which should be sifted about a quarter of an inch thick over every " part. Should the weather become hot and dry, a few gentle waterings will greatly " promote the growth of the young plants. After this, nothing more will be required but " keeping the beds clear of weeds. The cones may be removed from the second to a third " bed, and great success has even been had upon a fourth bed. No time can be fixed for " the laying of the cones upon the beds; it depends entirely upon the dryness and warmth " of the weather."

And here it will be necessary to remark, that a plentiful stock of seed is absolutely necessary, in order to obtain a full crop of plants; for when these stand thin on the ground, they are very liable to be thrown out by the frost in the first winter. A full crop should rise like a brush; the roots will then be matted together, forming a tough bed that will resist the severest winter. Plants raised in the manner here recommened, rise with greater vigour than those sown in the common way; from which it appears that the seed of the Larch, and probably we may say of all the Pine tribe, decreases in its vegetative power, after it has been taken from the cones. And it is not improbable but that keeping the cones *dry* during the winter, may be productive of the same bad effect.

Mr. Speechly has not the least doubt but that the various kinds of Firs and Pines may be raised in the same easy and profitable manner; though his experiments have hitherto been confined to the Larch.

12. PINUS *(CANADENSIS)* foliis solitariis linearibus obtusiusculis submembranaceis. Lin. Sp. Pl. 1421. Abies foliis solitariis confertis obtusis membranaceis. Gron. Virg. 191. *THE CANADA SPRUCE FIR.*

This is a native of North America. It grows on the mountains and higher lands, and arrives at a considerable size. The varieties are: The White Canada Spruce, the Red Canada Spruce, and the Black Canada Spruce. These only differ in the colour of their cones, which are small.

This GENUS of plants belongs to the class and order *Monoecia Monadelphia*, there being male and female flowers on the same plant, and the stamina joined in one body, at their base. These twelve species flower in the months of April and May. The male flowers are collected in conic bunches, and the females in close cones, which grow into the real cones, containing the seeds.

BOOK I. best; unleſs we had more commerce of them from our plantations in New England, which are preferable to any of them; there lying rotting at Piscataway a mast of such prodigious dimensions, as nobody will adventure to ship and bring away. All these bear their seeds in conic figures, after an admirable manner and closeneſs, to protect their winged seeds. The Hemlock-tree, as they call it in New England, is a kind of Spruce.

All the sorts of Pines are produced from seeds. These seeds are got by laying the cones before a very gentle fire, or rather by exposing them to the beams of the sun, and often turning them. The seeds of the Larch-tree are particularly difficult to separate from the cone, so that we are generally obliged to be at the expence of slitting the cones into quarters with knives; an operation both tedious and expensive. The following are the directions given by Mr. Miller for the propagation of this Genus of Plants.

"The best season for sowing the seeds of Pines is about the end of March; and when "the seeds are sown the beds should be covered with nets, otherwise, when the plants "begin to appear, with the husk of the seed on their heads, the birds will pick them off "and deſtroy them.

"Where the quantity of seeds to be sown is not great, it will be a good way to sow "them either in boxes or pots, filled with a light loamy earth, which may be removed "from one situation to another, according to the season of the year; but if there is a large "quantity of the seeds, so as to require a good space to receive them, they should be sown "on an east or north-eaſt border, where they may be skreened from the sun, whose heat "is very injurious to these plants at their first appearance above ground. Those seeds "which are sown in pots or boxes, should also be placed in a shady situation, but not "under trees; and if they are skreened from the sun with mats at the time when the plants "first come up, it will be a good method to preserve them.

"Most of the sorts will come up in about six or seven weeks after they are sown; but "the seeds of the Stone or cultivated Pine, and two or three of the others, whose shells "are very hard, frequently lie in the ground a whole year; so that when the plants do not "come up the first year, the ground should not be disturbed, but kept clean from weeds, "and the following spring the plants will rise. This frequently happens in dry seasons, "and when they are sown in places a little too much exposed to the sun. Therefore the "surest method is, to soak the seeds in water twenty-four hours before they are sown.

"When the plants appear, they must be constantly kept clean from weeds; and in very "dry seasons, if they are now and then gently refreshed with water, it will forward their "growth; but this must be done with great care and caution; for if they are hastily wa- "tered, it will wash the tender plants out of the ground, or lay them down flat, which "often rots their shanks; so that unleſs it be judiciously performed, it will be the best "way to give them no water, but only skreen them from the sun.

"If the plants come up too close, it will be a good method to thin them gently about "the middle of July. The plants which are drawn up may then be planted on other beds,

In the Scottish Highlands are trees of wonderful altitude (though not altogether so tall, thick, and fine as the former) which grow upon places so inacceſsible, and so far from the sea, that, as one says, they seem to be planted by God on purpose for nurseries of seed, and monitors to our industry, reserved, with other bleſsings, to be discovered in our days amongst the new-invented improvements of husbandry, not known to our southern people of this nation. Did we consider the pains they take

" which ſhould be prepared ready to receive them, for they ſhould be immediately planted as " they are drawn up, because their tender roots are soon dried and spoiled at this season of " the year. This work should be done, if poſsible, in cloudy or rainy weather, and then " the plants will draw out with better roots, and will soon put out new fibres again; but " if the weather should prove clear and dry, the plants should be shaded every day from " the sun with mats, and now and then gently refreshed with water. In drawing up the " plants, there should be great care taken not to disturb the roots of the plants left re- " maining in the seed-beds; so that if the ground be hard, the beds should be well watered " some time before the plants are thinned, to soften and loosen the earth; and if after the " plants are drawn out, the beds are again gently watered to settle the earth to the roots of " the remaining plants, it will be of great service to them; but it must be done with great " care, so as not to wash out their roots, or lay down the plants. The distance which " should be allowed these plants in the new beds, may be four or five inches, row from " row, and three inches in the rows.

" Let the plants remain in the seed-bed till the spring twelvemonth, by which time they " will be fit to transplant where they are to remain for good: for the younger the plants " are when planted out, the better they will succeed; for although some sorts will bear " transplanting at a much greater age, yet young plants planted at the same time will, in a " few years, overtake the large ones, and soon outstrip them in their growth; and there is " this advantage in planting young, it saves the expence of staking, and much watering, " which large plants require. I have often seen plantations of several sorts of Pines, " which were made of plants six or seven feet high, and at the same time others of one " foot high planted between them, which in ten years were better trees than the old ones, " and much more vigorous in their growth; but if the ground where they are designed to " remain cannot be prepared by the time before-mentioned, the plants ſhould be planted " out of the beds into a nursery, where they may remain two years, but not longer; for it " will be very hazardous to remove these trees at a greater age.

" The best season to transplant all the sorts of Pines is about the latter end of March " or the beginning of April, just before they begin to shoot; for although the Scotch Pine, " and some of the most hardy sorts, may be transplanted in winter, especially when they " are growing in strong land, where they may be taken up with balls of earth to their " roots; yet this is what I would not advise for common practice, having frequently seen it " attended with bad consequences; but those which are removed in the spring rarely fail.

" Where these trees are planted in exposed situations, they should be put pretty close

BOOK I. to bring them out of the Alps, we should leſs stick at the difficulty of transporting them from the utmost parts of Scotland. To the former sorts we may add the Esterund Firs, Tonsberry, Frederickstadt, Hilleren, Holmstrand, Landifer, Stavanger, Lawrwat, &c. There is likewise a kind of Fir called in Dutch the Green-boome, much used in building of ships, though not for men of war, because of its lightneſs, and that it

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" together, that they may shelter each other; and when they have grown a few years, " part of the plants may be cut down to give room for the others to grow; but this must " be gradually performed, lest, by too much opening the plantation at once, the air should " be let in among the remaining trees with too great violence, which will stop their " growth.

" Although these evergreen trees are by many persons despised on account of their dark " green in summer, yet a proper mixture of them in large clumps makes a fine appearance " about a seat in winter; and in summer, by their contrast with other trees, they have a " good effect in diversifying the scene.

" Whenever large plantations are designed to be made, it will be proper to form the " nursery upon a piece of good ground as near the plantation as poſsible; or the cottagers " may be induced to raise the seeds, which will give employment to the women and " children at a time when the farmer has least occasion for their aſsistance.

" The Scotch Pine, as was before observed, being the hardiest of all the kinds, and the " wood of it the most useful, is the sort which best deserves our care. This will thrive " upon the most barren sands, where scarce any thing else, except heath and furze, will " grow. There are many thousand acres of such land lying convenient for water-carriage, " (at present affording no benefit to the public,) that might, by plantations of these trees, " become good estates to their proprietors, and also a national benefit; and as the legis- " lature has taken this into consideration, and already paſsed some laws for the encouraging " these plantations, as also for their preservation and security, so it may be hoped that this " improvement will be undertaken by the gentlemen who are poſsesſsed of such lands in all " the different parts of the kingdom; for although they may not expect to receive much " profit from these plantations in their own time, yet their succeſsors will be highly bene- " fited; and the pleasure which those growing trees will afford, by beautifying the present " dreary parts of the country, will in some measure recompense them for their trouble and " expence; and by creating employment for the poor, leſsen those rates which are now so " high in many parts of this kingdom.

" The expence of making these plantations is what most people are afraid of; but the " greatest expence is that of fencing them from the cattle, &c. for the other is trifling, as " there will be no neceſsity for preparing the ground to receive the plants; and the charge " of planting an acre of land with these plants will not be more than twenty or thirty " shillings, where labour is dear, exclusive of the plants which may be valued at forty " shillings more. I have planted many acres of land with these trees, which were covered " with heath and furze, and only dug holes between to put in the plants, and afterward

is not so strong as Oak; but yet proper enough for vefsels of great burden, which stand much out of the water: This sort comes into Holland from Norway, and other Eastland countries; it is somewhat heavier than Fir, and stronger; nor do either of them bend sufficiently. As to the seeds, they may be sown in beds, or cases, at any time during March; and when they peep, carefully defended with Furzes, or the like fence, from

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" laid the heath or furze, which was cut, upon the surface of the ground about their roots, " to prevent the ground from drying—and few of the plants have failed. These plants " were most of them four years old from seed, nor was there any care taken to clean the " ground afterward, but the whole left to shift for themselves; and in five or six years the " Pines grew so well as to overpower the heath and furze, and destroy it.

" The distance which I generally allow these plants, in all large open situations, is " about four feet, but always irregular, avoiding planting in rows as much as posible; " and in the planting, great care should be used not to take up the plants faster than they " can be put down, so that some men should be employed in digging up the plants while " others are planting. Those who take up the plants must be looked after, to see they do " not tear off the roots, or wound the bark; and as fast as they are taken up, their roots " should be covered to prevent their drying, and put into their new quarters as soon as " posible. In planting them, care should be had to make the holes large enough for their " roots, as also to loosen and break the clods of earth, and put the finest immediately " about their roots, then to settle the earth gently with the foot to the roots of the plant. " If these things are duly observed, and a proper season be chosen for planting, " there will be very little hazard of succefs; but I have seen some plantations made with " plants which were brought from a great distance, and had been so closely packed up as " to cause a heat, whereby most of the plants within had their leaves changed yellow, and " few of them have grown, which has discouraged others from planting, not knowing the " true cause of the failure.

" After the plantations are made, the only care they require for five or six years, will be " to secure the plants from cattle, hares and rabbits; if these are admitted to them, they " will make great destruction in a short time; for if the branches are gnawed by hares " or rabbits, it will greatly retard the growth of the plants, if not destroy them entirely.

" In about five or six years after planting, the branches of the young trees will have " met, and begin to interfere with each other; therefore they will require a little pruning; " but this muft be done with great caution. The lower tier of branches only should be " cut off; this should be performed in September, at which time there will be no danger " of the wounds bleeding too much, and the turpentine will harden over the wounds, as " the season grows cold, so will prevent the wet from penetrating the wounds. These " branches should be cut off close to the stem of the plants, and care should be taken " in doing this, not to break any of the remaining branches of the young trees. This work " should be repeated every other year, at each time taking off only the lower tier of " branches; for if the plants are much trimmed, it will greatly retard their growth, as it

BOOK I. the rapacious birds, which are very apt to pull them up, by taking hold of that little infecund part of the seed, which they commonly bear upon their tops. The beds wherein you sow them had need to be sheltered from the southern aspects, with some skreen of reed, or thick hedge: Sow them in shallow rills, not above half an inch deep, and cover them with fine light mould; being risen a finger in height, establish their weak

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" does in general that of all trees; but as these trees never put out any new shoots where " they are pruned, so they suffer more from amputation than those which do.

" In those parts of France where they have forests of these trees, the proprietors always " bestow their fagots upon those who give the first pruning to their young trees, for their " labour; so it costs them no money. At the second pruning, the proprietor has one third " of the fagots, and the dreſsers have the other two for their work; and afterwards the " fagots are equally divided between the workmen and proprietors; but there must be " great care taken that they do not cut off more than they ought.

" In about twelve or fourteen years these will require no more pruning, for their upper " branches will kill those below where they have not air; but soon after this, if the plants " have made good progreſs, it may be neceſsary to thin them; and this should be gradually " performed, beginning in the middle of the plantation first, leaving the outside close " to skreen those within from the cold, so by degrees coming to them at last, whereby " those which were first thinned will have had time to get strength, so will not be in " danger of suffering from the admiſsion of cold air. When these plantations are thinned, " the trees should not be dug up, but their stems cut off close to the ground; for their " roots never shoot again, but decay in the earth, so there can no harm arise by leaving " them, and hereby the roots of the remaining plants are not injured. The trees which " are now cut will be fit for many purposes: Those which are straight will make good " putlocks for the bricklayers, and serve for scaffolding poles; ſo that there may be as much " made by the sale of these, as will defray the whole expence of the planting, and " probably the interest of the money besides.

" As the upright growth of these trees renders their wood the more valuable, they " should be left pretty close together, whereby they will draw each other up, and grow " very tall. I have seen some of these trees growing, whose naked stems have been more " than seventy feet high, and as straight as a walking-cane; and from one of these trees " there were as many boards sawed, as laid the floor of a room near twenty feet square.— " If these trees are left eight feet asunder each way, it will be sufficient room for their " growth; therefore if, at the first thinning, a fourth part of the trees are taken away, the " others may stand twelve or fourteen years longer, by which time they will be of a size " for making ladders and standards for scaffolding, and many other purposes; so that, from " this sale, as much may be made, as not only to pay the remaining part of the expence " of planting, if any should be wanting in the first, but rent for the land with interest."

Although this long extract may not perfectly coincide with the sentiments of every planter of Pines, yet in general I think it will be of use. The following letter, addreſsed

stalks by sifting some more earth about them, especially the Pines, which being more top-heavy, are more apt to swag. When they are of two or three years growth, you may transplant them where you please; and when they have gotten good root, they will make prodigious shoots, but not for the three or four first years comparatively. They will grow both in moist and barren gravel and poor ground, so it be not over sandy and

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to me by James Farquharson, Esq. upon the method of raising the Larch and the Scotch Pine, will, I flatter myself, be highly acceptable. Such liberal commnnications deserve greatly of the public.

Marlee, (Scotland) June 22, 1775.

" ———— In order to raise plantations of the Scotch Fir, let the cones be " gathered in the month of February, or March, from thriving young trees, as the old ones " are not easily accessible, nor so productive of seed. These are to be exposed to the " heat of the sun, thinly spread on any kind of coarse canvas, taking them under cover " in the night-time, and only exposing them when the sun shines. This soon makes the " cones expand with a crackling noise. When any quantity of the seed is shed, it must " be separated from the cones by a searce, otherwise the first-dropped seeds would become " too dry before the cones yielded their whole quantity, which often takes up a consider- " able time; so that we are sometimes obliged to dry the cones in kilns, to make them " give their contents in time for sowing—which ought to be done the end of April " or beginning of May. The first method of procuring the seed is certainly the most " eligible, though the other answers very well when attentively performed, so as not to " damage the seed by too much heat. A light loamy soil, trenched a foot and a half deep, " and laid out in beds five feet broad, answers the best for sowing. Let the seeds " be sown very thick, and covered with a thick sifting of mould from the alleys. Plants " raised in this manner will rise like a brush. No kind of manure should be given to the " beds, as productive of weeds; the drawing of which not only brings up many of the " tender plants, but loosens the ground, and makes blanks that let in frosts in winter and " drought in summer. To give an idea of the sowing, I never consider my crop of plants " good, unless I have above a thousand in each foot long of the beds, that is, in five square " feet. Upon their having two seasons growth, I plant them out irregularly from the " seed-bed, about three feet asunder, upon the mountainous grounds where they are " to rise to perfection. I begin to plant the driest ground in autumn, eighteen months " after sowing, and persist in this operation until the frost prevents me. I begin again in " February, or rather as the weather admits, and continue this work sometimes to the end " of April, so as to plant out the product of the two-year old seed-beds. I put the plants " into the ground with two cuts of a spade, thus >. I raise the point of the angle with " what we call a dibble, and laying the plant up to the neck, stamp down the raised sod " with the foot. In this method, two men may plant a thousand in a day. When the " ground is rocky, or very stony, I use a dibble, shod with iron, having a cleft at the " extremity to lead down the root, putting the plants into the ground in the manner that

BOOK I. light, and want a loamy ligature; but before sowing (I mean here for large designs) turn it up a foot deep, sowing or setting your seeds an hand distance, and riddle earth upon them; in five or fix weeks they will peep. When you transplant, water them well before, and cut the clod out about the root, as they do melons out of the hot-bed, which knead close to them like an egg: Thus they may be sent safely many miles,

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" Cabbages are planted. One man will plant as many in this way, as two in the other; " yet the first method is preferable where the ground admits of it, as I have always " observed fewer plants to fail. My reason for planting from the seed-bed is, that " it comes nearest, to the operation of nature. Plants removed from the seed-bed into the " nursery, must have their roots pruned considerably before they can be planted into the " pits where they are to continue, which adds greatly to the expence. Besides, *nursing* " causes a luxuriant growth in this hardy mountainous tree, which spoils its nature and " robs it of longevity.

" It is generally believed that there are two kinds of Fir trees, the produce of Scot- " land, viz. the red or resinous large tree, of a fine grain, and hard solid wood; the other, " a white wooded Fir, with a much smaller proportion of resin in it, of a coarser grain, " and of a soft spungy nature; it never comes to such a size, and is more liable to decay. " At first appearance this would readly denote two distinct species, but I am convinced " that all the trees in Scotland, under the denomination of Scotch Fir, are the same; and " that the difference of the quality of the wood, and size of the trees, is entirely owing to " circumstances, such as climate, situation, and the soil they grow in. The finest Fir- " trees appear in the most mountainous parts of the Highlands of Scotland, in Glens, or " on sides of hills generally lying to a northerly aspect, and the soil of a hard gravelly " consistence, being the natural produce of these places. The winged seeds are scattered " in quantities by the wind, from the cones of the adjacent trees, which expand in April " and May with the heat of the sun; these seedlings, when young, rise extremely close, " together, which makes them grow straight, and free from side-branches of any size, to " the height of fifty or sixty feet before they acquire the diameter of a foot: Even in this " progress to height they are very slow, occasioned by the poorness of the soil, and the " numbers on a small surface, which I may say makes them in a constant state of war for " their scanty nourishment, the stronger and tallest by degrees overtopping the weaker, " and when the winds blow they lash against one another; this assists in beating off any " horizontal branches that might damage the timber with knots, as well as by degrees " crushes the overtopped trees. In such state of hostility they continue struggling until " the master-trees acquire some space around them; then they begin to shoot out in a more " bushy manner at the top, gradually losing their spiral form, increasing afterwards more " in size of body than height, some acquiring four feet diameter, and about sixty feet " of height to the branches, fit for the finest deal board. The growth is still extremely slow, " as is plainly proved by the smallness of the grain of the wood, which appears distinctly " in circles from the centre to the bark. Upon cutting a tree over close at the root, I can

but the top must neither be bruised, nor much leſs cut, which would dwarf it for ever: One kind also will take of slips or layers, interred about the latter end of August, and kept moist.

3. The best time to transplant, were in the beginning of April; they will thrive mainly in a stiff, hungry clay, or rather loam; but by no

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" venture to point out the exact age, which, in these old Firs, comes to an amazing " number of years. I lately pitched upon a tree of two feet and a half diameter, which " is near the size of a planted Fir of fifty years of age, and I counted exactly two hundred " and fourteen circles or coats, which makes this natural Fir above four times the age " of the planted one. Now as to planted Firs; these are raised first in dreſsed ground " from the seed, where they stand two seasons or more; they are then planted out in the " ground they are to continue in at regular distances, so have a clear circumference round " them for extending both roots and branches. The one gives too quick nourishment to " the tree which shoots out in luxuriant growth, and the other allows many of the branches " to spread horizontally, spoiling the timber with knots; besides, this quick growth, " occasions these thick yearly circular coats of wood, which form a coarse grain " of a spungy soft soft nature. The juices never after ripen into a proportional quantity " their resinous preservative balm; so that the plantations decay before the wood acquires " age, or a valuable size; and the timber, when used in work, has neither strength, " beauty, nor duration. I believe the climate has likewiſe a great share in forming the " nature of the best wood, which I account for in the following manner: The most moun- " tainous parts of the Highlands, particularly the northerly hanging situations, where these " fine Fir trees are, have a much shorter time of vegetation than a more southerly exposure, " or the lower open countries, being shaded by high hills from the rays of the sun, even " at mid-day, for months together; so that, with regard to other vegetables, nature visibly " continues longer in a torpid state there than in other places of the same latitude. This " dead state of nature for so long a time yearly, appears to me neceſsary to form the " strength and health of this particular species of timber. No doubt they may at first " show a gratefulneſs for better soil and more sun, by shooting out spontaneously; but if the " plant or tree is so altered by this luxury, that it cannot attain any degree of perfection " fit for the purposes intended, the attempt certainly proves in vain.

" From what is said above, it is not at all my intention to diſsuade from *planting* Scotch " Fir, but to encourage those that have the proper soil and situation to do so; being of " opinion that where these circumstances agree, and there, planting not in lines, but " irregularly and thicker than common, the trees will come to be of equal size and value " with the *natural* ones. In confidence of this, I have planted several millions on the sides " of hills, out of the reach of seed from the natural Firs.

" As to the Larch, it grows in this country, in great abundance, from the seed of our " own plantations. I have found this beautiful and hardy tree to answer extremely well " when planted out, on barren grounds, from six inches to six feet high; and they are

BOOK I. means in over light, or rich soil: Fill the holes therefore with such barren earth, if your ground be improper of itself; and if the clay be too stiff and untractable, with a little sand, removing them with as much earth about the roots as is posſible, though the Fir will better endure a naked transplantation than the Pine. If you be neceſsitated to plant towards the latter end of summer, lay a pretty deal of horse-litter upon

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" seldom known to fail, except where water has reached their roots. I have often " remarked with surprise, that when cattle or deer have broken off the main shoots with " their horns, another branch has taken the lead, and stretched away at such a rate as to " heal up the wound so completely, that in a few years it was with difficulty I could " discover the traces of the injury. The amazing growth of the Larix far exceeds " with me all the native as well as foreign trees, bearing the exposure and inclemency of " the season better than any of them; and of late I have the pleasure to find that they " naturalize themselves by sowing. I wish my experience could aſsist me in speaking " with as much certainty with regard to the value and uſefulneſs of the timber; but in that " I can give but little satisfaction, as my oldest trees are not thirty years from the seed.— " At Dunkeld I have seen a small summer-house finished with Larix wood; the plants " come from London in earthen pots, about the year 1740, rather as a curiosity, than from " any expectation of their excellency. Though full of circular knots, the wood looked " well, and did not seem to gall or warp so much as Fir of the same age and seasoning " would have done. It will be neceſsary to remark, that the heart or centre of large trees " is generally the knottiest part of the trunk, occasioned by the collateral branches, when " young, supporting the stem to stature, which, as the tree advances, die and fall off; and " this is particularly evident in trees that grow in thickets. The surface soon heals over, " and the body of the tree is annually increased by circular rings of wood. I shall suppose " a tree to be a foot in diameter when the lower branches die and drop off. In course of " time it acquires four feet in diameter, which gives a surrounding coat, one foot and " a half in thickneſs, of clean timber, the centre remaining knotty. The growth of the " Larix, and manner of dropping its branches when close together, very much resembles " the Fir; so I am confident this fault of knottineſs, which seems to be the principal one, " will amend by age. Yours, &c."

The valuable plantations of Firs now growing upon Crooksbury Heath, in the county of Surrey, prove to what a profitable purpose such kind of land may be applied: The Heath consists of near 3700 acres; the soil a deep sand, and covered with short heath. In 1776 twelve acres of this Heath were planted with Scotch Firs, four years old, at the distance of four feet. The ground was no ways prepared, but the holes were simply dug, and the plants put in. In 1788 the plants were thinned, being then about the height of fourteen feet, and produced eight pounds per acre. The thinnings were sold for hop-poles, and the branches were made into bavins for burning lime. Mr. Giles of Farnham, in the neighbourhood of this Heath, has for many years used no other poles than Firs for hops, and which he has found to answer full as well as Ash or Alder. Those he has at present, have

the surface of the ground, to keep off the heat, and in winter the cold; but let no dung touch either stem or root: You may likewise sow in such earth about February; they will make a shoot the very first year of an inch; next an handful; the third year three feet, and thence-forward above a yard annually. A northern Gentleman (who has obliged me with this proceſs upon his great experience) aſsures me that

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been nine years in use, and at this time are perfectly sound. He has attended with much accuracy to their durable quality as applied to the purpose of hop-poles: and he finds that Larch is the best, the Weymouth Pine the next, and the Scotch and Spruce, the least durable. The second thinnings (1794) are now taking place, and the trees are converted into scantlings and rafters, being about forty feet in height. The number of trees at present standing upon the twelve acres, are computed at 18,531, and are valued at 573l.

It would appear from the hardy nature of the Fir, and the readineſs with which it grows in almost every part of this island, that it is an indigenous tree; yet Cæsar expreſsly says that it is not a native. In his description of the country, he observes, that Britain had all the trees of Gaul, except the Beech and Fir: *Materia cujusque generis, ut in Gallia, præter Fagum et Abietem.* As all the British words for the Beech are clearly of Roman derivation, Faighe, Faghe, or Faydh, it is probable that it was introduced into Britain with the Roman colonies; but with regard to the Fir, the case is otherwise, for many of its names are purely British; and this is a testimony not to be overthrown. The ingenious Mr. Whitaker, in the first volume of his History of Manchester, p. 309, treats this subject with great learning and precision. He says, "Among the many Roman names for the Fir in the British "language, there are three which are purely and absolutely British. The Scotch distin-"guish the Fir by the British appellation of Gius; the Irish, by the British appellation of "Giumhus; and the Welch, by the British appellation of Fynniduydh. Had the Fir been "originally introduced into the fields of Britain by the Romans, all the British appro-"priated appellations of it must have been, as some of them evidently are, the mere de-"rivatives of the Roman Abies, Z-aban, S-ibuydh, S-apin, and S-abin. And the existence "of one British appropriated appellation for the Fir is a strong argument in itself that the "tree was not introduced by the Romans, but that it was originally British.

"Firs actually appear as early as the third century in the unromanized regions of "Caledonia and Ireland, and appear as the acknowledged Aborigines of the country. "Firs are frequently mentioned in the poems of the Caledonian Bard, not as plants seen "by him on the continent or in the provinces, not merely as forming the equivocal "imagery of a similitude, but as actually and antiently growing in both. The spear of a "warrior, says an Irishman in Ulster, pointing to a neighbouring tree, *is like that blasted "Fir:* And it is compared by another to the Fir of Slimora particularly, a mountain in the "north of Ireland. And the tomb of a fallen warrior, upon the western shore of Cale-"donia, is thus described from the reality by the Bard: *Dost thou not behold, Malvina, a rock "with its head of heath? Three aged Firs bend from its face; green is the narrow plain at its feet.*

"The Fir is also discovered in our Mancunian moſses together with the Birch and the "Oak, as frequent as the Oak, and much more frequent than the Birch. The Fir of our

BOOK I. Fir, and this Feralis Arbor, as Virgil calls it, the Pine, are abundantly planted in Northumberland, which are in a few years grown to the magnitude of ship-masts; and from all that has been said, deduces these encouragements: 1. The facility of their propagation; 2. The nature of their growth, which is to affect places where nothing else will thrive; 3. Their uniformity and beauty; 4. Their perpetual verdure; 5. Their sweetneſs; 6. Their fruitfulneſs, affording seed, gum, fuel, and timber, of all other woods the most useful and easy to work; all which highly recommend it as an excellent improvement of husbandry, fit to be enjoined by some solemn edict to the inhabitants of this our island, that we may have masts, and those other materials, of our own growth.—In planting the Silver Abies, set not the roots too deep; it affects the surface more than the rest.

PINE. 4. The Pine (of which are reckoned no leſs than ten several sorts, preferring the domestic, or sative, for the fuller growth,) is likewise

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" moſses is not, as the wild hypothesis of some aſsert it to be, a mere mimickry of the " natural Fir, merely an Oak or a Birch that, lying for ages in the unctuous maſs, has " discharged itself of all its original properties, and has adopted all the characteristic pro- " perties of the Fir. Had this been the case, it could not poſsibly be distinguished from " the Oak or the Birch, and all the trees of our moſses must have been equally and abso- " lutely Firs. The Fir is the only tree of our moſses that exhibits a resinous quality. And " the Fir of our moſses is as much discriminated to the eye, by the peculiar nature of its " grain, as the Oak or the Birch. Nor is this all: The Fir is perpetually discovered in such " of our moſses particularly as were demonstrably prior to the settlement of the Romans " among us. It is discovered in such moſses as appear to the present period actually tra- " versed by the roads of the Romans. It is discovered immediately adjoining to the road, " and absolutely on both sides of it. Thus is the Fir found very frequent in the moſs of " Failsworth, close to either margin of the street, and mingled with Oaks and Birches. " And as the road demonstrates the moſs to have been formed before the settlement of the " Romans at Manchester, so the trees discovered in the moſs must have been all equally " cotemporary with it, and all equally with it prior to the settlement of the Romans at " Manchester. This argument carries a decisive authority with it: But we can prosecute " it fairly up to demonstration: The Fir has been discovered in our moſses, not only in " such parts as are immediately contiguous to the Roman roads over them, but in such as " are actually occupied and covered with the line of the Roman roads, and in the black " spongy earth immediately beneath the Roman gravel. It has been very recently dug " up by myself under the roots of the road over Failsworth Moſs. And I have now in my " own poſseſsion two pieces of tried genuine Fir that were bedded with the remains of " a Birch tree one yard and a half in the moſsy soil, and three yards under the crown of " the Roman gravel.

" These are three arguments which are all sufficiently convincing of themselves: These

of both sexes, whereof the male growing lower, with a rounder shape, hath its wood more knotty and rude than the female; it is lank, longer, narrow, and pointed; bears a black, thick, large cone, including the kernel with an hard shell, covered under a thick scale: The nuts of this tree, (not much inferior to the almond,) are used, among other ingredients, in beatilla-pies at the best tables. They should be gathered in June before they gape; and having hung two years, (for there will be always some ripe, and some green on the same tree,) preserve them in their nuts, in sand, as you treat acorns, &c. till the season invite, and then set or sow them in ground which is cultivated like the Fir in most respects; only you may bury the nuts a little deeper. By a friend of mine they were rolled in a fine compost made of sheep-dung, and scattered in February, and this way never failed Fir and Pine; they came to be above an inch high by May; and a Spanish author tells us, that to macerate them five days in a child's urine, and three days in water, is of wonderful effect: This were an expeditious proceſs for great plantations; unleſs

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" are three arguments which, springing from as many different sources, all happily unite " together in one common channel, and form together an irresistible tide of evidence. " And a fact which relates to the remotest antiquity, and which is asserted against the " highest historical authority, cannot be too powerfully demonstrated. The Fir then was " one of the trees of Britain before the arrival of the Romans among us."

The Pine was sacred to Cybele, who turned her beloved Attis into that tree:

Et succincta comas, hirsutaque vertice Pinus;
Grata Deum matri. Siquidem Cybeleïus Attis
Exuit hac hominem, truncoque induruit illo. OVID. MET.

It was a custom among the antients, when they gave over any employment, to devote their instruments, and hang them up in some sacred place. Virgil alludes to this custom when he makes Corydon say,

Hic arguta sacra pendebit fistula Pinu. ECL. vii.

Pendebatque vagi pastoris in arbore votum
Garrula sylvestri fistula sacra Deo. PROPERT.

Some years ago, a stone was discovered in *Provence*, in *France*, on which was figured a Pine-tree with all the symbols of Cybele and Attis. Two tympanums hang on the branches of the tree on one side, and on the other a *pastoral pipe*, agreeable to ancient custom. MONTFAUCON, vol. I.

BOOK I. you would rather set the Pine as they do peas, but at wider distances, that when there is occasion of removal, they might be taken up with the earth and all; I say taken up, and not removed by evulsion, because they are, of all other trees, the most obnoxious to miscarry without this caution; and therefore it were much better, where the nuts might be commodiously set and defended, never to remove them at all, as it gives this tree so considerable a check. The safest course of all, were to set the nuts in an earthen pot, and, in frosty weather, to show it a little to the fire; the entire clod will come out with them, which are to be reserved, and set in the naked earth, in convenient and fit holes prepared before-hand, or so soon as the thaw is universal.. Some commend the strewing a few oats at the bottom of the fosses, or pits, in which you transplant the naked roots, for a great promotement of their taking, and that it will cause them to shoot more in one year than in three: But to this I have already spoken. Other kinds not so rigid, nor the bark, leaf, cone, and nuts so large, are those called the Mountain-Pine, a very large stately tree. There is likewise the Wild or Bastard Pine and Tæda, clad with thin long leaves, and bearing a turbinated cone: Abundance of excellent rosin comes from this tree. There is also the Pinaster, another of the wild kind; but none of them exceed the Spanish, called by us the Scotch Pine, its tall and erect growth making it proper for large and ample walks and avenues. Several of the other wild sorts incline to grow crooked. But for a more accurate description of these coniferous trees, and their perfect distinctions, consult our Mr. Ray's most elaborate and useful work, where all that can be expected or desired, concerning this profitable, as well as beautiful tree, is amply set down. Hist. Plant. lib. xxv. cap. i.

5. I am assured, by a person most worthy of credit, that in the territory of Elsasz, (a country in Germany where they were miserably distressed for wood, which they had so destroyed, as that they were reduced to make use of straw for their best fuel,) a very large tract being newly ploughed, (but the wars surprising them they did not sow,) there sprung up the next year a whole forest of Pine-trees, of which sort of wood there was none at all within less than fourscore miles; so as it is verily conjectured by some, the winged seeds might be wafted thither from the country of Weteravia, which is the nearest part to that where they grow. If this be true, we are no more to wonder how, when our Oak-woods

are grubbed up, Beech, and trees of other kinds have frequently succeeded them. What some impetuous winds have done in this nature, I could produce instances almost miraculous. I shall say nothing of the opinion of our Master Varro, and the learned Theophrastus *, who were both of faith, that the seeds of plants dropped out of the air. Pliny, in book xvi. chap. xxxiii. upon discourse of the Cretan Cypreſs, attributes much to the indoles and nature of the soil, virtue of the climate, and impreſsions of the air. And indeed it is very strange, what is affirmed of that pitchy rain, reported to have fallen about Cyrene, the year 430, V. C. after which, in a short time, sprung up a whole wood of the trees of Laserpitium, producing a precious gum, not much inferior to Benzoin, if at least the story be warrantable. But these aërial irradiations, various conceptions, and equivocal productions without seed, &c. are difficulties to be solved by our philosophers; also whence those leaves of the Platan come, which Dr. Spon tells us, in his Travels, are found floating in some of the fountains of the isles of the Strophades, no such tree growing near them by thirty miles: Though these may haply be conveyed though some unknown subterranean paſsage; for were it by the wind, the leaves being very large, they would be seen flying in, or falling out of the air.

* De Causis, lib. i. cap. v.

6. In transplanting of these coniferous trees, which are generally resinaceous, viz. Fir, Pine, Larix, Cedar, and which have but thin and single roots, you must never diminish their heads, nor be at all busy with their roots, which pierce deep, and is all their foundation, unleſs you find any of them bruised, or much broken; therefore such down-right roots as you may be forced to cut off, it were safe to sear with an hot iron, and prevent the danger of bleeding, to which they are obnoxious even to destruction, though unseen and unheeded. Neither may you disbranch them, but with great caution, as about March, or before, or else in September, and then it is best to prune up the side-branches close to the trunk, cutting off all that are above a year old; if you suffer them too long, they grow too big, and the cicatrice will be more apt to spend the tree in gum; upon which accident, I advise you to rub their wounds over with a mixture of cow-dung; the neglect of this cost me dear, so apt are they to spend their gum. Indeed, the Fir and Pine seldom outlive their being lopped. Some advise us to break the shells of Pines, to facilitate their delivery, and I have eſsayed, but to my loſs; nature does obstetricate and do that office of herself, when it is the proper season.

PINASTER.

7. The domestic Pine grows very well with us, both in mountains and plains. But the Pinaster, or wilder, of which there are four sorts, is best for walks, *pulcherrima in hortis*, as already we have said, because it grows tall and proud, maintaining its branches at the sides, which the other Pine does leſs frequently. There is in New England a very broad Pine, which increases to a wonderful bulk and magnitude, insomuch that large canoes have been excavated out of the body of it, without any addition. But besides these large and gigantic Pines, there is the Spinet, with sharp thick bristles, yielding a rosin or liquor odorous, and useful in carpentry work.

8. The Fir grows tallest, being planted reasonably close together, but suffers nothing to thrive under it. The Pine not so inhospitable; for, by Pliny's good leave, it may be sown with any tree, all things growing well under its shade, and excellent in woods: Hence Claudian,

> Et comitem quercum Pinus amica trahit.
>
> The friendly Pine the mighty Oak invites.

9. They both affect the cold, high, and rocky grounds, *Abies in montibus altis*. Those yet which grow on the more southern and leſs exposed quarters, a little visited with the beams of the sun, are found to thrive beyond the other, and to afford better timber; and this was observed long since by Vitruvius of the Infernates, as he calls them, in comparison with the Supernates; which, growing on the northern and shady side of the Apennines, were nothing so good, which he imputes to the want of due digestion. They thrive, as we said, in the most sterile places, yet will grow in better, but not in over-rich and pinguid. The worst land in Wales bears, as I am told, large Pine; and the Fir, according to his aspiring nature, loves also the mountain more than the valley; but it cannot endure the shade, as Theophrastus observes, de Pl. lib. iv. cap. i. But this is not rigidly true, for they will grow in consort, till they even shade and darken one another; and will also descend from the hills, and succeed very well, being desirous of plentiful waterings till they arrive to some competent stature; and therefore they do not prosper so well in an over-sandy and hungry soil or gravel, as in the very entrails of the rocks, which afford more drink to the roots that penetrate into their meanders and winding receſses. But though they require this refreshing

at first, yet do they perfectly abhor all stercoration; nor will they much endure to have the earth opened about their roots for ablaqueation, or be disturbed: This is also to be understood of Cypreſs. A Fir, for the first half-dozen years, seems to stand, or at least make no considerable advance; but it is when thoroughly rooted, that it comes away miraculously. That honourable and learned Knight, Sir Norton Knatchbull, whose delicious plantation of Pines and Firs I beheld with great satisfaction, has aſsured me, that a Fir-tree of his raising, did shoot no leſs than sixty feet in height in little more than twenty years. The same speedy growth may be observed in the trees belonging to Sir Peter Wentworth at Lillingston-Lovel; Cornbury in Oxfordshire; and other places; but especially those in Harefield-park, in the county of Middlesex, belonging to Mr. Serjeant Nudigate, where there are two Spanish, or Silver Firs, that, being planted there *anno* 1603, at two years growth from the seed, are now (1679) become goodly masts: The biggest of them, from the ground to the upper bough, is eighty-one feet, though forked on the top, which has not a little impeded its growth: The girt or circumference below is thirteen feet, and the length, so far as is timber, that is, to six inches square, seventy-three feet; in the middle seventeen inches square, amounting by calculation to one hundred and forty-six feet of good timber. The other tree is indeed not altogether so large, by reason of its standing near the house when it was burnt, about forty years since, when one side of the tree was scorched also; yet it has not only reecovered that scar, but thrives exceedingly, and is within eight or nine feet as tall as the other, and and would probaby have been the better of the two, had not that impediment happened, it growing so taper and erect, as nothing can be more beautiful. This, I think, if we had no other, is a pregnant instance, as of the speedy growing of that material, so of all the encouragement I have already given for the more frequent cultivating this ornamental, useful, and profitable tree, abounding, doubtleſs, formerly in this country of ours, if what a grave and authentic author writes be true; Athenæus * relating, that the stupendous veſsel, built so many ages since by Hiero, had its mast out of Britain. Take notice, that none of these mountainous trees should be planted deep, but as shallow as may be for their competent support.

* Deipnosoph.

PICEA.

10. The Picea, already described, grows on the Alps among the Pine, but neither so tall nor so upright, but bends its branches a little, which

BOOK I. have the leaf quite about them, short and thick, not so flat as the Fir. The cones grow at the point of the branches, and are much longer than most other cones, containing a small darkish seed. This tree produces gum almost as white and firm as frankincense: But it is the Larix (another sort of Pine) that yields the true Venetian turpentine, of which hereafter.

11. There is also the Piceaster, a wilder sort, the leaves stiff and narrow-pointed, and not so close, out of which the greatest store of pitch is boiled. The Tæda likewise, which is, as some think, another sort abounding in Dalmatia, more unctuous, and more patient of the warmer situations, and so inflammable, that it will slit into candles; and therefore some will by no means admit it to be of a different species, but a metamorphosis of over-grown fattineſs, to which the most judicious incline. But of these, the Grand Canaries, and all about the mountains near Teneriff, are full, where the inhabitants do usually build their houses with the timber of the Pitch-tree. They cut it also into wainscot, in which it succeeds marvellously well; abating that it is so obnoxious to firing, that whenever a house is attacked they make all imaginable haste out of the conflagration, and almost despair of extinguishing it. They also use it for candle-wood, and to travel in the night by the light of it, as we do by links and torches. Nor do they make these Tëas, as the Spaniards call them, of the wood of Pine alone, but of other trees, as of Oak and Hasel, which they cleave and hack, and then dry in the oven or chimney, but have certainly some unctuous and inflammable matter in which they afterwards dip it: And thus they do in Biscay, as I am credibly informed.

12. The bodies of these being cut, or burnt down to the ground, will emit frequent suckers from the roots; but so will neither the Pine nor Fir, nor indeed care they to be topped. But the Fir may be propagated of layers and cuttings, which I divulge as a considerable secret that has been eſsayed with succeſs [s].

[s] The Rev. Mr. Cordiner, in his "Antiquities of the North of Scotland," confirms what Mr. Evelyn has here remarked. Speaking of *Mar Forest*, he says, "I long admired one "very noble Pine with various tops; it exhibited an uncommon appearance. The branches

13. That all these, especially the Fir and Pine, will prosper well with us, is more than probable; because it is a kind of demonstration, that they did heretofore grow plentifully in Cumberland, Cheshire, Staffordshire, and Lancashire, if the multitudes of these trees to this day found entire, and buried under the earth, though supposed to have been overthrown, and covered so over since the universal deluge, be indeed of this species. Dr. Plot speaks of a Fir-tree in Staffordshire of one hundred and fifty feet high, which some think of spontaneous growth, besides several more so irregularly standing, as shows them to be natives. But to put this at last out of controversy, see the extract of Mr. de la Prim's letter to the Royal Society, Transactions, number 277, and the old map of Croul, and of the yet, or lately remaining Firs growing about Hatfield in the commons, flourishing from the shrubs and stubs of those trees, to which I refer the reader. As for buried trees of this sort, the late Dr. Merrett, in his Pinax, mentions several places of this nation where subterraneous trees are found; as, namely, in Cornwall, *ad finem terræ, in agris Flints;* and in Pembrokeshire, towards the shore, where they so abound, *ut totum littus* (says the Doctor) *tanquam silva cædua apparet;* they are also found in Cheshire, Cumberland, and Anglesey, and in several of our Euro-boreal tracts, where they are called Noah's ark. By Chatnefse, in Lancashire, says Camden, the low mofsy ground was no very long time since carried away by an impetuous flood, and in that place now lies a low irriguous vale, where many prostrate trees have been dug out. And from another I receive, that in the moors of Somersetshire, towards Bridgewater, some lengths of pasture growing much withered, and parched more than other places of the same ground, in a great drought, it was observed to bear the length and shape, in grofs, of trees; they dug, and found in the spot Oaks as black as Ebony, and have been from hence instructed to take up many hundreds of the same kind. In a fenny tract of the Isle of Axholme, lying part in Lincolnshire, and part in Yorkshire, have

SUBTERRANEAN TREES.

"of prodigious size, and most irregularly wreathed, seemed to bend under their weight "of timber: one of them had reached the ground, taken root, and for many years drew "nourishment from the new stock, which also reared an additional tree: but either "through the increasing strength and elasticity of the parent branch, or loosened by some "violent agitation of the great stem of the tree, the large new roots have been torn from "the soil, and now hang suspended a great way from the ground, with other branches "darting from them."

BOOK I. been found Oaks five yards in compaſs, and fifteen in length, some of them erect, and standing as they grew, in firm earth below the moors, with abundance of Fir, which lie more stooping than the Oak, some being thirty-six yards long besides the tops. And so great is the store of these subterraneans, as the inhabitants have for divers years carried away above two thousand cart-loads yearly: See "Dugdale's History of Draining." This might be of good use for the like detections in Eſsex, Lincolnshire, and places either low situate, or adjacent to the sea; also at Binfield-heath in Kent, &c. These trees were (some think) carried away, in times past, by some accident of inundation, or by waters undermining the ground, till their own weight and the winds bowed them down and overwhelmed them in the mud: For it is observed, that these trees are no where found so frequently as in boggy places. But that the burning of these trees so very bright, should be an argument that they were Fir, is not neceſsary, since the bituminous quality of such earth may be imparted to them. There are in Cumberland, on the sea-shore, trees sometimes discovered at low-water, and at other times, that lie buried in the sand; and in other moſsy places of that country, it is reported the people frequently dig up the bodies of vast trees without boughs, and that by direction of the dew alone in summer; for they observe it never lies upon that part under which those trees are interred. These particulars I find noted by the ingenious author of the Britannia Baconica. How vast a forest, and what goodly trees were once standing in Holland, and those low countries, till about the year 860, when an hurricane obstructing the mouth of the Rhine, near Catwic, made that horrid devastation good authors mention. And they do this day find monstrous bodies and branches, (nay, with the very nuts, most entire) of prostrate and buried trees, near to Veer, especially towards the south, and at the bottom of the waters: Also near Bruges, in Flanders, whole woods have been found twenty ells deep, in which the trunks, boughs, and leaves do so exactly appear, as to distinguish their several species, with the series of their leaves yearly falling: Of which see Boetius de Boot.

Dr. Plot, in his Natural History of Oxfordshire and Staffordshire, mentions divers subterraneous Oaks, black as Ebony, and of mineral subtance for hardneſs, quite through the whole substance of the timber, caused, as he supposes, and learnedly evinces, by a vitrioliċ humour of the earth,

of affinity to the nature of the ink-galls which that kind of tree produces. Of these he speaks of some found sunk under the ground, in an upright and growing posture, to the perpendicular depth of sixty feet, of which one was three feet in diameter, of an hardneſs emulating the politest Ebony. These trees had none of them their roots, but were found plainly to have been cut off by the kerf. There were great store of Hasel-nuts, whose shells were as sound as ever, but no kernel within. It is there the inquisitive author gives you his conjecture how these deep interments happened; namely, by our ancestors, many ages since, clearing the ground for tillage, and, when wood was not worth converting to other uses, digging trenches by the sides of many trees, in which they buried some, and others they flung into quagmires and lakes to make room for more profitable agriculture. In the mean time, concerning this moſsy wood, as they usually term it, because, for the most part, dug up in moſsy and moory bogs where they cut for turf, it is highly probable, with the learned Mr. Ray, that these places were, many ages since, part of firm land covered with wood, afterwards undermined and overwhelmed by the violence of the sea, and so continuing submerged till the rivers brought down earth and mud enough to cover the trees, filling up the shallows, and restoring them to Terra Firma again: this he illustrates from the like accident upon the coast of Suffolk, about Dunwich, where the sea continues at this day, as for many years past, to incroach upon the land, undermining and subverting by degrees a great deal of high ground, so as by antient writings it appears a whole wood of more than a mile and a half, at present is so far within the sea. Now if, in succeeding ages, as it is probable enough, the sea shall by degrees be filled up, either by its own working, or by earth brought down by land-floods, still subsiding to the bottom and surmounting the tops of these trees, and so the space added again to the firm land, the men that shall then live in those parts will, it is likely, dig up these trees, and as much wonder how they came there, as we do at present those we have been speaking of.

In the mean time, to put an end to the various conjectures concerning the causes of so many trees being found submerged, for the most part attributed to the destruction made by the Noatic inundation; after all has been said of what was found in the level of Hatfield, drained at the never-to-be-forgotten charge and industry of Sir Cornelius Vermuiden, I think there will need no more inquiry. For there were discovered trees, not

BOOK I. only of Fir and Pitch, but of very goodly Oaks, even to the length of one hundred feet, which were sold at fifteen pounds the tree, black and hard as Ebony; all their roots remaining in the soil, and in their natural posture, with their bodies prostrate by them, pointing for the most part north-east: And of such there seemed to be millions of all the usual species natural to this country, sound and firm, Ash only excepted, which were become so rotten and soft, as to be frequently cut through with the spade only; whereas Willows and other tender woods, continued very sound and entire. Many of these subterranean trees, of all sorts, were found to have been cut and burnt down, squared and converted for several uses, into boards, pales, stakes, piles, bars, &c. Some trees half-riven, with the wedges sticking in them; broken ax-heads, in shape of sacrificing instruments, and frequently several coins of the Emperor Vespasian, &c. There was, among others, one prodigious Oak of one hundred and twenty feet in length, and twelve in diameter, ten feet in the middle, and six at the small end; so as, by computation, this monster must have been a great deal longer; and for this tree was offered twenty pounds. The truth and history of all this is so perfectly described by Abr. de la Pryme, inserted among the transactions of the Royal Society[t], that there needs no more to be said of it to evince that, not

[t] "In many of these grounds, as well in England and Ireland, as in other parts of the world, there are found vast numbers of trees standing with their stumps erect, and their roots piercing the ground in a natural posture as when growing. Many of those trees are broken or cut off near the roots, and lie along, and this usually in a north-east direction. People who have been willing to account for this, have usually resolved it into the effect of the deluge in the days of Noah; but this is a very wild conjecture, and is proved false by many unanswerable arguments. The waters of this deluge might indeed have washed together a great number of trees, and buried them under loads of earth; but then they would have lain irregularly and at random; whereas they all lie lengthwise from south-west to north-east, and the roots all stand in their natural perpendicular posture, as close as the roots of trees in a forest. Beside, these trees are not all in their natural state, but many of them have the evident marks of human workmanship upon them, some being cut down with an ax, some split, and the wedges still remaining in them; some burnt in different parts, and some bored through with holes. These things are also proved to be of a later date than the deluge, by other matters found among them, such as utensils of ancient people, and coins of the Roman Emperors. It appears from the whole, that all the trees which we find in this fossile state, originally grew in the very places where we now find them, and have only been thrown down and buried there, not brought from elsewhere. It may appear indeed an objection to this opinion, that most of these fossile-trees are of the

only here, but in other places where such trees are found in the like circumstances, it has been the work and effects of vast armies of the Romans, when finding they could not with all their force subdue the barbarous inhabitants, by reason of their continual iſsuing out of those intricate fortreſses and impediments, they caused whole forests to be cut down by their legions and ſoldiers, who were never suffered to remain idle during their winter-quarters, but were continually exercised in such public and useful works as required a multitude of hands; by which discipline they became hardy, active, and leſs at leisure to mutiny, or corrupt one another. I do not affirm that this answers all submerged trees, but of very many imputed to other causes.

But we shall inquire farther concerning these subterranean productions anon, and whether the earth, as well as the water, have not the virtue of strange transmutations. These trees are found in moors, by poking with staves of three or four feet long shod with iron.

13. In Scotland, as we noted, there is a most beautiful sort of Fir, or Pine rather, bearing small sharp cones, (some think it the Spanish Pinaster) growing upon the mountains; of which, from the late Marquis of Argyll,

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Fir kind; and that Cæsar says expreſsly, that no Firs grew in Britain in his time: but this is easily answered by observing, that these, though of the Fir-kind, yet are not the species usually called the *Fir*, but Pitch-tree; and Cæsar has no where said that Pitch-trees did not grow in England. Norway and Sweden yet abound with these trees; and there are at this time whole forests of them in many parts of Scotland, and a large number of them wild upon a hill at Wareton in Staffordshire to this day. In Hatfield-marsh, where such vast numbers of the foſsile-trees are now found, there has evidently once been a whole foreſt of them growing. The last of these was found alive and growing in that place within seventy years last past, and cut down for some common use. It is also objected by some to the system of the Firs growing where they are found foſsile, that these countries are all bogs and moors, whereas these sorts of trees grow only in mountainous places. But this is founded on an error; for though in Norway and Sweden, and some other cold countries, the Fir kinds all grow upon barren and dry rocky mountains, yet in warmer places they are found to thrive as well on wet plains. Such are found plentifully in Pomerania, Livonia, and Courland, &c. and in the weſt parts of New England there are vast numbers of fine stately trees of them in low grounds. The whole truth seems to be, that these trees love a sandy soil; and such as is found at the bottoms of all the moſses where these trees are found foſsile. The roots of the Fir-kind are always found fixed in these; and those of oaks, where they are found foſsile in this manner, are usually found fixed in clay;

BOOK I. I had some seeds sent me, which I have sown with tolerable succeſs; and I prefer them before any other, because they grow both very erect, and and fixing themselves stoutly, need little or no support. Near Loch-broom, betwixt the loch and an hill, they grow in such quantity, that,

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ſo that each kind of tree is always found rooted in the places where they stand in their proper soil; and there is no doubt to be made but that they originally grew there. When we have thus found that all the foſsile trees we meet with once grew in the places where they are now buried, it is plain that in these places there were once noble forests, which have been destroyed at some time; and the question only remains how and by whom they were destroyed. This we have reason to believe, by the Roman coins found among them, was done by the people of that empire, and that at the time when they were established or establishing themselves here. Their own historian tells us, that when their armies purſued the wild Britons, these people always sheltered themselves in the miry woods, and low watery forests. Cæsar expreſsly says this; and observes, that Caſsibelan and his Britons, after their deſeat, paſsed the Thames, and fled into such low moraſses and woods, that there was no pursuing them: and we find that the Silures secured themselves in the same manner when attacked by Ostorius and Agricola. The same thing is recorded of Venutius, king of the Brigantes, who fled, to secure himself, into the boggy forests of the midland part of this kingdom: and Herodian expreſsly says, that in the time of the Romans pushing their conquests in these islands, it was the custom of the Britons to secure themselves in the thick forests which grew in their boggy and wet places, and when opportunity offered to iſsue out thence and fall upon the Romans. The consequence of all this was the destroying all these forests; the Romans finding themselves so plagued with parties of the natives iſsuing out upon them at times from these forests, gave orders for the cutting down and destroying all the forests in Britain which grew on boggy and wet grounds. These orders were punctually executed; and to this it is owing that at this day we can hardly be brought to believe that such forests ever grew with us as are now found buried. The Roman histories all join in telling us, that when Suetonius Paulinus conquered Anglesea, he ordered all the woods to be cut down there, in the manner of the Roman generals in England: and Galen tells us, that the Romans, after their conquest in Britain, kept their soldiers constantly employed in cutting down forests, draining of marshes, and paving of bogs. Not only the Roman soldiers were employed in this manner, but all the native Britons made captives in the wars were obliged to aſsist in it: and Dion Caſsius tells us, that the Emperor Severus lost no leſs than 50,000 men in a few years time in cutting down the woods and draining the bogs of this island. It is not to be wondered at, that such numbers executed the immense destruction which we find in these buried forests. One of the greatest subterranean treasures of wood is that near Hatfield; and it is easy to prove, that these people, to whom this havock is thus attributed, were upon the spot where these trees now lie buried. The common road of the Romans out of the south into the north, was formerly from Lindum (Lincoln,) to Segelochum (Little Burrow upon Trent,) and from thence to Danum (Doncaster,) where they kept a standing garrison of Crispinian horse. A little off on the east and north-east of their road,

from the spontaneous fall, ruin, and decay of the trees lying acroſs one another to a man's height, partly covered with moſs, and partly earth and graſs, which rots, fills up, and grows again, a considerable hill has, in proceſs of time, been raised to almost their very tops, which, being an ac- CH. XXII.

between the two last named towns, lay the borders of the greatest forest, which swarmed with wild Britons, who were continually making their sallies out, and their retreats into it again, intercepting their provisions, taking and destroying their carriages, killing their allies and paſsengers, and disturbing their garrisons. This at length so exasperated the Romans, that they were determined to destroy it; and to do this safely and effectually, they marched against it with a great army, and encamped on a great moor not far from Finuingly: this is evident from their fortifications yet remaining. There is a small town in the neighbourhood called *Osterfield;* and as the termination *field* seems to have been given only in remembrance of battles fought near the towns whose names ended with it, it is not improbable that a battle was fought here between all the Britons who inhabited this forest, and the Roman troops under Ostorius. The Romans slew many of the Britons, and drove the rest back into this forest, which at that time overspread all this low country. On this the conquerors taking advantage of a strong south-west wind, set fire to the Pitch-trees, of which this forest was principally composed; and when the greater part of the trees were thus destroyed, the Roman soldiers and captive Britons cut down the remainder, except a few large ones, which they left standing as remembrances of the destruction of the rest. These single trees, however, could not stand long against the winds, and these falling into the rivers which ran through the country, interrupted their currents; and the water then overspreading the level country, made one great lake, and gave origin to the moſses or moory bogs, which were afterwards formed there, by the workings of the waters, the precipitation of earthy matter from them, and the putrefaction of rotten boughs and branches of trees, and the vast increase of water-moſs and other such plants which grow in prodigious abundance in all these sorts of places. Thus were these burnt and felled trees buried under a new-formed, spongy, and watery earth, and afterwards found on the draining and digging through this earth again. Hence it is not strange that Roman weapons and Roman coins are found among these buried trees; and hence it is that among the buried trees some are found burnt, some chopped and hewn; and hence it is that the bodies of the trees all lie by their proper roots, and with their tops lying north-east, that is, in that direction in which a south-west wind would have blown them down: hence also it is, that some of the trees are found with their roots lying flat, these being not cut or burned down, but blown up by the roots afterwards when left single; and it is not wonderful, that such trees as these should have continued to grow even after their fall, and shoot up branches from their sides which might easily grow into high trees." *Phil. Trans. No.* 275.

By this system it is easily explained why the moor-soil is in some places two or three yards thicker than in others, or higher than it was formerly, since the growing up of peat-earth or bog-ground is well known, and the soil added by overflowing of waters, is not a little. As the Romans were the destroyers of this great and noble forest, so

BOOK I.

cident of singular remark, I thought fit to mention. Both Fir and Pine (sociable trees) planted pretty near together, shred and clipt at proper seasons, make stately, noble, and very beautiful skreens and fences to protect Orange, Myrtle, and other curious greens, from the scorching of the sun and ruffling winds, preferable to walls. See how to be planted and cultivated, with the dimensions of a skreen, in the rules for the defence of gardens, annexed to De la Quintin, No. xv. by Mr. London and Mr. Wise. In the mean time, none of these sorts are to be mingled in the taller woods or copses, in which they starve one another, and lose their beauty. And now those who would see what innumerable trees of this kind Scotland produces, should consult the learned Sir Robert Sibbald[u].

14. For the many and almost universal use of these trees both sea and land will plead;

——————dant utile lignum
Navigiis Pinos—————— GEORG. ii.

The useful Pine for ships——————

Hence Papinius VI. Thebaid. calls it *Audax Abies*. They make our best masts, sheathing, scaffold-poles, &c. heretofore the whole vessel. It is pretty, saith Pliny, to consider that those trees, which are so much sought

they were probably also of the several other antient forests; the ruins of which furnishes us with the bog-wood of Staffordshire, Lancashire, Yorkshire, and other counties. But as the Romans were not much in Wales, in the Isle of Man, or in Ireland, it is not to be supposed that forests cut down by these people gave origin to the fossile wood found there; but though they did not cut down these forests, others did; and the origin of the bog-wood is the same with them and with us. Holingshead informs us, that Edward I. being not able to get at the Welch, because of their hiding themselves in boggy woods, gave orders at length that they should all be destroyed by fire and by the ax; and doubtless the roots and bodies of trees found in Pembrokeshire under ground, are the remains of the execution of this order. The fossile wood in the bogs of the Island of Man is doubtless of the same origin, though we have not any accounts extant of the time or occasion of the forests there being destroyed; but as to the fossile trees of the bogs of Ireland, we are expressly told, that Henry II. when he conquered that country, ordered all the woods to be cut down that grew in the low parts of it, to secure his conquests, by cutting away the places of resort of rebels.

[u] Sibbaldi Scotia illustrata, sive Prodromus Historiæ Naturalis.

after for shipping, should most delight in the highest mountains, as if they fled from the sea on purpose, and were afraid to descend into the waters: *Situs in excelso montium, ceu maria fugeret.* With Fir we make all intestine works, as wainscot, floors, pales, balks, laths, boxes, and bellies for musical instruments in general; nay, the ribs and sides of that enormous stratagem, the so famous Trojan Horse, were made of this material, if the Poet mistake not,

——————Sectaque intexunt Abiete costas. ÆN. ii.

——————The ribs with deal they fit.

there being no material more obedient and ready to bend for such works.

In Holland they receive their best masts out of Norway, and even as far as Muscovy, which are best esteemed, as consisting of long fibres without knots, but deal boards from the first; and though Fir rots quickly in salt water, it does not so soon perish in fresh; nor do they yet refuse it in merchant-ships, especially the upper parts of them, because of its lightness. The true Pine was ever highly commended by the antients for naval architecture, as not so easily decaying; and we read that Trajan caused vessels to be built both of the true and spurious kind, well pitched, and overlaid with lead, which perhaps might hint our modern sheathing with that metal at present. Fir is exceedingly smooth to polish on, and therefore does well under gilding work, and takes black equally with the Pear-tree. Both Fir and Pine succeed well in carving, as for capitals, festoons, nay statues, especially being gilded, because of the easiness of the grain to work, and take the tool every way; and he that shall examine it nearly will find that famous image of the blessed Virgin at Loretto, (reported to be carved by the hands of St. Luke,) to be made of Fir, as the grain easily discovers it. The Torulus, as Vitruvius terms it, and heart of deal, kept dry, rejecting the albumen and white, is everlasting; nor does there any wood so well agree with the glew as it, or is so easy to be wrought. It is also excellent for beams, and other timber-work in houses, being both light and exceedingly strong, and therefore of very good use for bars and bolts of doors, as well as for doors themselves, and for the beams of coaches; a board of an inch and a half thick will carry the body of a coach with great ease, by reason of a natural spring which it has, not easily violated. You shall find that of old they

BOOK I. used it for carts and other carriages, also for piles to superstruct on in boggy grounds. Most of Venice and Amsterdam is built upon them, with so excefsive charge, that the foundations of their houses, as some report, cost as much as what is erected upon them, there being driven in no fewer than thirteen thousand six hundred and fifty-nine great masts of this timber under the new Stadt-house of Amsterdam. For scaffolding also there is none comparable to it; and I am sure we find it an extraordinary saver of Oak, where it may be had at a reasonable price. I will not complain what an incredible mafs of ready money is yearly exported into the nothern countries for this sole commodity[x], which might all be saved were we industrious at home, or could have it out of Virginia, there being no country in the whole world stored with better; they have, besides, another sort of wood, which they call Cypref's, much exceeding either Fir or Pine for this purpose, being as tough and springy as Yew, and bending to admiration; it is also lighter than either, and everlasting in wet or dry, so as I much wonder that we inquire no more after it. In a word, not only here and there an house, but whole towns and great cities are and have been built of Fir only; nor that alone in the north, as Moscow, &c. where the very streets are paved with it, (the bodies of the trees lying prostrate one by one in the manner of a raft,) but the renowned city of Constantinople, and, nearer home, Thoulouse in France was, within little more than an hundred years, most of Fir, which is now wholly marble and brick, after eight hundred houses had been burnt, as it often happens at Constantinople—a place where no accident even of this devouring nature will at all move them to rebuild with more lasting materials. To conclude with the uses of Fir; we have most of our potashes of this wood, together with our torch, or funebral staves; nay, and of old, spears of it, if we may credit Virgil's Amazonian Combat:

——————————Cujus apertum
Adversi longâ transverberat abiete pectus. ÆN. xi.

——————————She prest
A long Fir spear through his exposed breast.

[x] Mr. Cox informs us, that in the city of Christiana alone, the capital of Norway, there are 136 privileged saw-mills, and that the quantity of planks permitted to be cut amounts annually to 20,000,000 standard deals, twelve feet long, and one inch and a quarter thick.

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Lastly, The very chips or shavings of deal boards are of other use than to kindle fires alone: Thomas Bartholinus, in his *Medicina Danorum*, Diſsert. vii. where he disclaims the use of hops in beer as pernicious and malignant, and from several instances how apt it is to produce and usher in infections, nay plagues, &c. would substitute in its place the shavings of deal boards, to give a grateful odour to the drink; and how sovereign those resinous woods, the tops of Fir and Pines, are against the scorbut, gravel in the kidneys, &c. we generally find. It is in the same chapter that he commends also Wormwood, Marrubium, Chamelæagnum, Sage, Tamarisk, and almost any thing rather than hops. The bark of the Pine heals ulcers; and the inner rind cut small, contused, and boiled in store of water, is an excellent remedy for burns and scalds, washing the sore with the decoction, and applying the softened bark.—It is also sovereign against frozen and benumbed limbs. The distilled water of the green cones takes away the wrinkles of the face; cloths dipped therein, and laid upon the skin, becomes a cosmetic not to be despised. The Pine or Picea, buried in the earth, never decays. From the latter transudes a very bright and pellucid gum; hence we have likewise rosin. Also of the Pine are made boxes and barrels for dry goods; and it is cloven into shingles (scandulæ) for the covering of houses in some places. Hoops for wine-veſsels, especially of the flexible wild Pine, are made of it; not to forget the kernels, (this tree being always furnished with cones, some ripe, others green,) of such admirable use in emulsions; and for tooth-pickers, even the very leaves are commended. In sum, they are plantations which exceedingly improve the air by their odoriferous and balsamic emiſsions, and for ornament create a perpetual spring where they are plentfully propagated. And if it could be proved that the Almug-trees*, recorded 1 Reg. x. 12. (whereof pillars for that famous temple and the royal palace, harps, and psalteries, &c. were made,) were of this sort of wood, as some doubt not to aſsert, we should esteem it at another rate; yet we know Josephus affirms they were a kind of Pine-tree, though somewhat resembling the Fig-tree wood to appearance, as of a most lustrous candor. In 2 Chron. ii. 8. there is mention of Almug-trees growing in Lebanon; and if so, methinks it should rather be, as Buxtorf thinks, a kind of Cedar; (yet we find Fir also in the same period;) for we have seen a whiter sort of it, even very white as well as red; though some affirm it to be but the sap of it, as our cabinet-makers call it: I say there were both Fir and Pine-trees growing upon those

* Where the LXX (viz. 3 Kings x. 12.) calls it ἀπεπλέκητα *non dedolata*; others *ligna undulata*.

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mountains; and the learned Meibomius, in that curious treatise of his, *De Fabrica Triremium*, shows that there were such trees brought out of India, or Ophir. In the mean time, Mr. Purchas informs us that Dr. Dee writ a laborious treatise almost wholly on this subject, but I could never have the good hap to see it, wherein, as Commissioner for Solomon's timber, and like a learned architect and planter, he has summoned a jury of twelve sorts of trees; namely, 1. the Fir; 2. Box; 3. Cedar; 4. Cypress; 5. Ebony; 6. Ash; 7. Juniper; 8. Larch; 9. Olive; 10. Pine; 11. Oak; and 12. Sandal-trees, to examine which of them were this Almug, and at last seems to concur with Josephus in favour of Pine or Fir; who possibly, from some antient record or fragment of the wood itself, might learn something of it; and it is believed that it was some material both odoriferous to the scent, and beautiful to the eye, and of fittest temper to refract sounds, besides its serviceableness for building; all which properties are in the best sort of Pine, or Thya, as Pliny calls it; or perhaps it was some other rare wood, of which the Eastern Indies are doubtless the best provided; and yet I find that those vast beams which sustained the roof of St. Peter's church at Rome, laid, as reported, by Constantine the Great, were made of the Pitch-tree, and have lasted from A. D. 336, down to our days, above one thousand three hundred years.

See Plin. Hist. Nat. lib. xvi. cap. xi. or rather Theophrast. Hist. lib. ix. cap. ii. iii. et lib. xiv. cap. xx. lib. xxiii. cap. i. lib. xxiv. cap. vi.

15. But now whilst I am reciting the uses of these beneficial trees, Mr. Winthorp presents the Royal Society with the process of making tar and pitch in New England, which we thus abbreviate. Tar is made out of that sort of Pine-tree from which naturally turpentine extilleth; and which, at its first flowing out is liquid and clear; but, being hardened by the air, either on the tree or wherever it falls, is not much unlike the Burgundy-pitch; and we call them Pitch-pines out of which this gummy substance transudes. They grow upon the most barren plains, on rocks also, and hills rising amongst those plains, where several are found blown down, which have lain so many ages, as that their whole bodies, branches, and roots have perished, some certain knots only of the boughs remaining entire, (these knots are that part where the bough is joined to the body of the tree,) and lying at the same distance and posture as they grew upon the tree for its whole length. The bodies of some of these trees are not corrupted through age, but quite consumed and reduced to ashes by the annual burnings of the Indians when they set their grounds on fire, which yet has, it seems, no power over

these hard knots beyond a black scorching, although, being laid on heaps, they are apt enough to burn. It is of these knots they make their tar in New England and the country adjacent, whilst they are well impregnated with that terebinthine and reſinous matter, which, like a balsam, preserves them so long from putrefaction. The rest of the tree does indeed contain the like terebinthine sap, as appears, upon any slight incision of the bark on the stem or boughs, by a small crystalline pearl which will sweat out; but this, for being more watery and indigested, by reason of the porosity of the wood, which exposes it to the impreſsions of the air and wet, renders the tree more obnoxious; especially if it lie prostrate with the bark on, which is a receptacle for a certain intercutaneous worm that accelerates its decay. They are the knots then alone which the tar-makers amaſs in heaps, carrying them in carts to some convenient place not far off, where finding clay or loam fit for their turn, they lay an hearth of such ordinary stone as they have at hand: This they build to such an height from the level of the ground, that a veſsel may stand a little lower than the hearth to receive the tar as it runs out. But first, the hearth is made wide, according to the quantity of knots to be set at once, and that with a very smooth floor of clay, yet somewhat descending, or dripping, from the extreme parts to the middle, and thence towards one of the sides, where a gullet is left for the tar to run out at. The earth thus finished, they pile the knots one upon another, after the very same manner as our colliers do their wood for charcoal, and of a height proportionable to the breadth of the hearth, and then cover them over with a coat of loam, or clay, which is the best, or, in defect of those, with the best and most tenacious earth the place will afford, leaving only a small spiracle at the top, whereat to put the fire in, and making some little holes round about, at several heights, for the admiſsion of so much air as is requisite to keep it burning, and to regulate the fire by opening and stopping them at pleasure. The proceſs is almost the same with that of making charcoal; for when it is well on fire, the middle hole is also stopped, and the rest of the registers so governed as the knots may keep burning, and not be suffocated with too much smoak, whilst all being now thorough-heated, the tar runs down to the hearth, together with some of the more watery sap, which hasting from all parts towards the middle, is conveyed by the fore-mentioned gutter into the barrel or veſsel placed to receive it. Thus the whole art of tar-making is no other than a kind of rude distillation *per descensum*, and might therefore be as

BOOK I. well done in furnaces of large capacity, were it worth the expence. When the tar is now all melted out and run, they stop up all the vents very close, and afterwards find the knots made into excellent charcoal, preferred by the smiths before any other whatsoever which is made of wood, and nothing so apt to burn out when their blast ceaseth; neither do they sparkle in the fire as many other sorts of coal do; so as, in defect of sea coal, they make choice of this as best for their use, and give greater prices for it. Of these knots likewise do the planters split out small slivers about the thickneſs of one's finger, or somewhat thinner, which serve them to burn instead of candles, giving a very good light. This they call candle-wood, and it is in much use in New-England and Virginia, and amongst the Dutch planters in their villages; but for that it is something offensive, by reason of the much fuliginous smoak which comes from it, they commonly burn it in the chimney corner, upon a flat stone or iron, except, occasionally, they carry a single stick in their hand as there is need of light to go about the house. It must not be conceived, by what we have mentioned in the former description of the knots, that they are only to be separated from the bodies of the trees by devouring time, or that they are the only materials out of which tar can be extracted; for there are in these tracts millions of trees which abound with the same sort of knots, and full of turpentine fit to make tar: But the labour of felling these trees, and of cutting out their knots, would far exceed the value of the tar, especially in countries where workmen are so very dear: But those knots above-mentioned are provided to hand, without any other labour than the gathering only. There are sometimes found of those sort of Pine-trees, the lowest part of whose stems towards the root is as full of turpentine as the knots; and of these also may tar be made. But such trees being rarely found, are commonly preserved to split into candle-wood, because they will be easily riven out into any lengths and scantings desired, much better than the knots. There be, who pretend an art of fully impregnating the body of any living Pine-tree, for six or eight feet high; and some have reported that such an art is practised in Norway. But, upon several experiments, by girdling the tree, as they call it, and cutting some of the bark round, and a little into the wood of the tree, six or eight feet distant from the ground, it has never yet succeeded. Whether the just season of the year was not observed, or what else omitted, were worth the disquisition, if at least there be any such secret amongst the Norwegians, Swedes, or any other nation.

Of tar, by boiling it to a sufficient height, pitch is made; and in some places where rosin is plentiful, a fit proportion of that may be dissolved in the tar whilst it is boiling, and this mixture is soonest converted to pitch; but it is of somewhat a differing kind from that which is made of tar only, without other composition. There is a way, which some ship-carpenters in those countries have used, to bring the tar into pitch for any sudden use, by making the tar so very hot in an iron kettle, that it will easily take fire, which when blazing, and set in any airy place, they let burn so long, till, by taking out some small quantity for trial, being cold, it appears of a sufficient consistence: then by covering the kettle close, the fire is extinguished, and the pitch is made without more ceremony. There is a process of making rosin also out of the same knots, by splitting them out into thin pieces, and then boiling them in water, which will educe all the resinous matter, and gather it into a body, which, when cold, will harden into pure rosin. It is moreover to be understood, that the Fir, and most coniferous trees, yield the same concretes, lachrymæ, turpentines, rosins, hard, naval or stone, and liquid pitch, and tar for remedies against arthritic and pulmonic affections: These the Chirurgeon uses in plaisters, and they are applied to mechanic, and other innumerable purposes. From their fuliginous vapour, raised by burning, especially the rosin, we have our lamp and printer's black. I am persuaded the Pine, Pitch, and Fir-trees in Scotland might yield his Majesty plenty of excellent tar, was some industrious person employed about the work. I wonder it has been so long neglected. CH. XXII.

Other processes for extracting of these substances may be seen in Mr. Ray's History of Plants, already mentioned, lib. xxix. cap. i. And as to pitch and tar, how they make it near Marseilles, in France, from the Pines growing about that city, see Philosophical Transactions, No. 243, p. 291, anno 1696, very well worthy the transcribing, if what is mentioned in this chapter were at all defective.

I had, in the former editions of the Silva, placed the Larix among the trees which shed their leaves in winter, as indeed it does, but not before there is almost immediate supply of fresh; let it therefore, from its similitude, stature, and productions, challenge rank among the coniferous. We raise it of seeds, and it grows spontaneously in Stiria, Carinthia, and other Alpine countries. The change of the colour of the LARIX.

old leaf made an ignorant gardener of mine eradicate what I had brought up with much care, as dead: Let this therefore be a warning. The leaves are thin, pretty long and bristly; the cones are small, and grow irregular, as do the branches. It is a very beautiful tree. The ponderous branches bend a little, in which it differs from the Libanus Cedar, to which some would have it allied; nor are any found in Syria. From the deep-wounded bark of this tree exudes the purest of our shop turpentines. From it also comes the drug Agaric. That it flourishes with us a tree of good stature, not long since to be seen about Chelmsford in Eſsex, sufficiently reproaches our not cultivating so useful a material for many purposes, where lasting and substantial timber is required: For we read of beams of no leſs than an hundred and twenty feet in length, made out of this goodly tree, which is of so strange a composition that it will hardly burn: *Et robusta Larix igni impenetrabile lignum;* for so Cæsar found it in a castle besieged by him. The story is recited at large by Vitruvius, lib. ii. cap. ix; but see what Philander says upon the place, on his own experience. Yet the coals thereof were held far better than any other for the melting of iron, and the lock-smith; and, to say the truth, we find they burn it frequently as common fuel in the Valtoline, if at least it be the true Larix, which they now call Meleze.—There is abundance of this Larch timber in the buildings at Venice, especially about the Palaces in Piazza San Marco, where I remember Scamozzi says he himself used much of it, and infinitely commends it.—Nor did they only use it in houses, but in naval architecture also. The ship mentioned by Witsen (a late Dutch writer of that useful art) to have been found not long since in the Numidian sea, twelve fathoms under water, was chiefly built of this timber and Cypreſs, both reduced to that induration and hardneſs, as greatly to resist the fire and the sharpest tool; nor was any thing perished of it, though it had lain above a thousand and four hundred years submerged. Tiberius, we find, built that famous bridge to his Naumachia with this wood; and it seems to excel for beams, doors, windows, and masts of ships; it resists the worm. Being driven into the ground, it is almost petrefied, and will support an incredible weight; which, and for its property of long resisting fire, makes Vitruvius wish they had greater plenty of it at Rome to make joists of, where the forum of Augustus was (it seems) built of it, and divers bridges by Tiberius; for that, being attempted with fire, it is long

in taking hold, growing only black without; and the timber of it is so exceedingly transparent, that in the dark night when cabins, made of the thin boards, have lighted candles in them, people who are at a distance without doors, would imagine the whole room to be on fire. The Larix bears polishing excellently well, and the turners abroad much desire it. Vitruvius says, it is so ponderous than it will sink in water. It makes everlasting spouts, pent-houses, and featheridge, which need neither pitch nor painting to preserve them; also excellent pales, posts, rails[y], pediments, and props for vines. To these add the palettes on which our painters blend their colours. Before the use of canvas and bed-tick, it formed the tables on which the great Raphael, and the famous artists of the last age, eternized their skill.

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[y] I am in poſseſsion of the rail of a gate made of Larch, which withstood the weather, without the least decay, for upwards of twenty years, during which period the Oak posts were twice renewed.

AN

EXPLANATORY TABLE

OF THE

Parts of FRUCTIFICATION of the different Species of Trees described in the SILVA.

Obs. The Parts marked with a Capital Letter are magnified.

The OAK. *Quercus (Robur.)*

Monoecia Polyandria.

a. A Male Catkin.
b. c. The Calyx. In some Flowers it is divided into four, in others into five segments.
B. C. Ditto.
d. An entire Flower.
D. Ditto, showing the situation of the Stamina.
e. A single Stamen.
E. Ditto.
f. A Female Flower.
F. Ditto.
g. The Acorn, or Nut, as it fits in its permanent Calyx.
h. Ditto, separated from the Calyx.
i. The Cup, or permanent Calyx.

The ELM. *Ulmus (Campestris.)*

Pentandria Digynia.

a. An entire Flower.
B. Ditto.
c. The Calyx.
C. Ditto.
d. The Stamina.
D. Ditto.
e. The Pointal, or Female part of the Flower.
E. Ditto.
f. The Seed.
g. A Branch, at the time of Flowering, which happens before the leaves appear.

The BEECH. *Fagus (Sylvatica.)*

Monoecia Polyandria.

a. A Catkin of Male Flowers.
b. A single Flower.
B. Ditto.
c. The Calyx.
C. Ditto.
d. A Female Flower.
e. The Calyx.
f. The Germen, or Embryo, with its three Pointals.
g. The two Embryos with their Pointals, as they sit in the Calyx.
h. The permanent Calyx become a Capsule, or Seed-vessel.
i. Ditto, as it opens at the top.
k. The two Seeds.

The HORNBEAM. *Carpinus (Vulgaris.)*

Monoecia Polyandria.

a. A Male Catkin.
b. A Male Flower with its Scale.
B. Ditto.
c. The Scale.
C. Ditto.
D. The Stamina.
e. The Female Catkin.
f. The Female Flower with its Scale.
F. Ditto.
G. The Scale.

h. The Petals.
H. Ditto.
i. The two Pointals.
I. Ditto.
k. The Petals grown larger, containing the two Seeds.
l. One of the Seeds.

The ASH. *Fraxinus (Excelsior.)*

POLYGAMIA DIOECIA.

a. An entire Hermaphrodite Flower.
A. Ditto. The Flowers have neither Calyx nor Petals, and are only furnished with two Stamina.
B. The two Stamina.
c. The Embryo, with its Pointal.
C. Ditto.
d. An entire Female Flower.
D. Ditto. They likewise have neither Calyx, Petals, nor Stamina, bearing only a Pointal.
e. A winged Seed. The Seeds of the Hermaphrodite and Female Flowers are alike.
f. The Crust opening to show where the Seed is lodged.
g. The Seed.

The CHESNUT. *Fagus (Caſtanea.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. A ſingle Flower.
B. Ditto.
c. The Calyx.
C. Ditto.
d. A Female Bud of Flowers.
e. A ſingle Flower.
f. The Calyx.
F. Ditto.
g. A ſingle Embryo, with its Pointals.
G. Ditto.
H. The two Embryos with their Pointals, set in their permanent Calyx.
i The ſpinous Capsule.
k. The same, opening at the top to emit the Nuts or Seeds.
l. A ſingle Nut.

The HORSE-CHESNUT. *Æsculus. (Hippo-caſtanum.)*

HEPTANDRIA MONOGYNIA.

a. An entire Flower.
b. The Calyx.
c. The five Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
f. The ſpinous Capsule.
g. A Transverse Section of ditto, showing the Partition and Receptacle.
h. Ditto, as it opens in three divisions.
i. The Nuts or Seeds.

The WALNUT. *Juglans (Regia.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. Ditto, in its natural size.
c. A single Male Flower.
d. The Petals.
e. The Stamina.
E. A single Stamen.
f. A Female Flower.
g. Ditto, in its natural size.
h The Calyx.
i. The Corolla.
k. The Embryo, with its Pointals.
l. The covering of the Shell. *Drupa.*
m. The Nut diveſted of its covering.
n. Ditto, ſplit open.
o. A Kernel.

The WHITE BEAM TREE. *Cratægus. (Aria.)*

ICOSANDRIA DIGYNIA.

a. An entire Flower.
b. The Calyx.
c. The Petals, or Flower Leaves.
d. The Stamina.
e. The Pointals.
f. The Embryo, as it sits within the Calyx, with its Pointals.
g. The Fruit, or Berry.
h A Transverse Section of ditto.

i. A Vertical Section of ditto.
k. The two Seeds.

The WILD SERVICE. *Cratægus (Torminalis.)*

Icosandria Digynia.

a. An entire Flower.
A. Ditto.
b. The Calyx.
B. Ditto.
c. The Petals.
C. Ditto.
d. The Stamina.
D Ditto.
e. The Pointals.
E. Ditto.
f. The Fruit, or Berry.
g. A Transverse Section of ditto.
h. The Seeds.

The WILD BLACK CHERRY. *Prunus (Cerasus.)*

Icosandria Monogynia.

a. The Calyx.
b. An entire Flower.
c. The Stamina.
d. A single Stamen.
D. Ditto.
e. The Embryo, with its Pointal.
E. Ditto.
f. The Berry.
g. A Vertical Section of ditto.
h. The Stone containing the Kernel.

The MAPLE. *Acer (Campestre.)*

Polygamia Monoecia.

a. The Hermaphrodite Flowers growing on the same bunch with the Male Flowers *f.*
A. An Hermaphrodite Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
E. Ditto.
g. A Male Flower without the Stamina, &c.
G. Ditto. The Calyx, Petals, and Stamina are the same as in the Hermaphrodite Flowers.
h. The two winged Seeds.
i. One Wing cut open to show the situation of the Seeds.
k. A Seed.

The SYCAMORE. *Acer (Pseudo-platanus.)*

Polygamia Monoecia.

a. The Hermaphrodite Flowers growing on the same bunch with the Male Flowers *f.*
b. The Calyx.
c. The Petals.
d. The Stamina.
E. The Embryo, with its Pointal.
f. The Male Flowers.
G. A Male Flower. The Petals and Stamina are the same as in the Hermaphrodite Flowers.
H. A Male Flower without the Stamina, &c.
i. The two winged Seeds.
k. One of the Wings cut open to show the situation of the Seed.
l. A Seed.

The LIME. *Tilia (Europæa.)*

Polyandria Monogynia.

a. An entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo, with its Pointal.
E. Ditto, with one Stamen and one Petal.
f. The Capsule.
g A Transverse Section of ditto.
h. The Capsule as it opens below.
i. The Seed.
k. A Bractea, or Floral Leaf.

The WHITE POPLAR. *(Populus Alba.)*

DIOECIA OCTANDRIA.

a. A Male Catkin.
b. An Entire Male Flower.
B. Ditto.
c. The Scale, or Squama.
d. The Nectarium.
D. Ditto.
E. A single Stamen.
f. The Female Catkin.
g. The Female Flower.
G. Ditto.
h. The Squama, or Scale.
I. The Embryo, with its quadrifid Stigma.
K. The Stigma.
l. The Capsule, or Seed-vefsel.
L. Ditto.
m. Ditto, discharging its Seed.
M. Ditto.
n. The Seeds.
N. Ditto.
o. The Nectarium of the Female Flower.
O. Ditto.

The QUICK-BEAM. *Sorbus (Aucuparia)*

ICOSANDRIA TRIGYNIA.

a. An Entire Flower.
A. Ditto.
b. The Calyx.
B. Ditto.
c. The five Petals, or Flower Leaves.
C. Ditto.
d. The Stamina.
D. Ditto.
e. The Embryo, with its three Stigmata.
E. Ditto.
f. The Fruit, or Berry.
g. A Transverse Section of ditto.
h. The three Seeds.

The HASEL. *Corylus (Avellana.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. A single Male Flower.
B. Ditto.
c. The Stamina.
C. Ditto.
D. A single Stamen.
e. The Female Flowers.
E. Ditto
f. Two lacerated Scales that enclose the Embryo with its two Pointals.
F. Ditto.
g. The Embryo, as it sits in the two Scales.
G. Ditto.
h. The Embryo.
H. Ditto.
i. The Nut.
k. A Vertical Section of ditto.
l. The Kernel.

The BIRCH. *Betula (Alba.)*

MONOECIA TETRANDRIA.

a. The Male Catkin.
b. The Calyx, consisting of three Scales containing three Flowers.
B. Ditto.
C. The three Flowers with their three Scales.
D. A single Flower.
E. Its four segments.
F. The Stamina.
g. The Female Catkin.
h. The Calyx, consisting of three Scales, each Scale containing two Embryos.
H. Ditto.
i. The Embryo, with its two Pointals.
I. Ditto.
k. The three Scales, each Scale containing two Seeds.
K. Ditto.
l. A Seed.
L. Ditto.

The ALDER. *Betula (Alnus.)*

MONOECIA TETRANDRIA.

a. The Male Catkin.
b. The Calyx, consisting of four Scales which contain three Flowers.
B. Ditto.
C. The three Flowers.
D. A single Flower.

E. The Petals.
F. The Stamina.
g. A Female Catkin.
h. The Calyx, consisting of three Scales, each Scale containing two Embryos.
H. Ditto.
i. The Embryo, with its two Pointals.
I. Ditto.
K. The Cone, or Fruit.
L. The three Scales, each containing two Seeds.
m. A Seed.
M. Ditto.

The CRACK WILLOW. *Salix (Fragilis.)*

DIOECIA DIANDRIA.

a. The Male Catkin growing on a different Tree from the Female.
b. A Male Flower.
B. Ditto, with its Nectarium *c*, and two Stamina *d. d.*
E. The Scale and Nectarium.
f. The Female Catkin.
g. A Female Flower.
G. Ditto.
H. The Embryo.
i. The Capsule.
I. Ditto.
K. A Tranverse Section of ditto.
L. As it bursts to emit the Seed.
M. A Seed.

The SCOTCH FIR. *Pinus (Sylvestris.)*

MONOECIA MONADELPHIA.

a. A Male Catkin.
b. The Gem, or Winter-Lodge (Hibernaculum.)
c. The Scale, or Squama.
d. A Cluster of Stamina.
D. Ditto.
e. A single Stamen,
E. Ditto, with its Scale *c*.
f. The future Cone.
g. A single Scale of the Cone, with its two Embryos,
G. Ditto.
H. A single Embryo.
i. The Cone.
k. The same opened to show how the Seeds are lodged.
l. The inner side of a Scale.
m. The two winged Seeds.

The WEYMOUTH PINE. *Pinus (Strobus.)*

MONOECIA MONADELPHIA.

a. The Gem, or Winter-Lodge (Hibernaculum.)
b. The Male Catkin.
C. A single Stamen, with its Scale.
D. The Scale.
E. A single Stamen.
f. The immature Cone.
g. A single Scale of ditto, with its two Embryos.
G. Ditto.
H. A single Embryo with its Pointal.
i. A Cone.
k. A single Scale, with its two winged Seeds.
l. A Seed.

The SILVER FIR. *Pinus (Picea.)*

MONOECIA MONADELPHIA.

a. The Gem, or Winter-lodge (Hibernaculum.)
b. A Male Catkin.
C. A single Stamen, with its Scale.
D. The Scale.
E. A Stamen.
f. The Female Catkin, or future Cone.
g. A single Scale, with its two Embryos.
G. Ditto.
H. A single Embryo, with its Pointal.
i. The Cone.
k. A single Scale, with its two winged Seeds.
l. A single Seed.

The SPRUCE FIR. *Pinus (Abies.)*

MONOECIA MONADELPHIA.

a. A Catkin of Male Flowers.
b. A single Stamen.
B. Ditto.
c. The future Cone.

d. As ingle Scale, with its two Embryos.
D. Ditto.
e. The Embryo, with its Pointal.
E. Ditto.
f. The Cone.
g. A single Scale, with its two winged Seeds.
h. A Seed.

The LARCH. *Pinus (Larix.)*

MONOECIA MONADELPHIA.

a. A Male Flower.
b. The Calyx.
c. The Calyx, showing the situation of the Stamina.
C. A single Stamen.
d. The Female Flowers, or immature Cone.
e. A single Scale, with its two Embryos.
E. Ditto.
f. A single Embryo, with its Pointal.
F. Ditto.
g. A Cone.
h. A single Scale, with its two winged Seeds.
H. Ditto.
N. B. This Figure is the American Larch.

The MULBERRY *Morus (Nigra.)*

MONOECIA TETRANDRIA.

a. A Male Catkin.
B. The Calyx.
c. A Male Flower.
C. Ditto.
D. One Stamen.
e. A Female Catkin.
f. A Female Flower.
F. Ditto.
G. The Calyx.
H. The Embryo, with its two Stigmata.
i. The Fruit, consisting of many Berries.
k. A single Berry.
l. A Seed.
L. Ditto.

The CEDAR. *Pinus (Cedrus.)*

MONOECIA MONADELPHIA.

a. A Male Catkin.
b. A single Scale, with its Stamen.
B. A single Scale, with its Stamen.
c. The future Cone.
d. A single Scale of the Cone, with its two Embryos.
D. Ditto.
e. A single Embryo, with its Pointal.
E. Ditto.
f. The Cone.
g. A single Scale, with its two winged Seeds.
h. A single Seed.

The ORIENTAL PLANE. *Platanus (Orientalis.)*

MONOECIA POLYANDRIA.

a. A globular Catkin of Male Flowers.
b. The Calyx.
B. Ditto.
c. The Entire Flower.
C. Ditto.
d. The Petals.
D. Ditto.
E. The Stamina.
F. A single Stamen.
g. A globular Bunch of Female Flowers.
h. The Calyx.
H. Ditto.
i. An Entire Flower.
I. Ditto.
k. The Petals.
K. Ditto.
L. The Embryo, with its Pointal.
m. The globular Cluster of Seeds.
n. The Receptacle to which the Seeds are affixed.
O. A Seed.

The OCCIDENTAL PLANE. *Platanus (Occidentalis.)*

MONOECIA POLYANDRIA.

a. A globular Cluster of Male Flowers.
b. The Calyx.
B. Ditto.
c. An Entire Flower.
C. Ditto.
d. The Petals.
D. Ditto.

E. The Stamina.
F. A single Stamen.
g. A globular Bunch of Female Flowers.
h. The Calyx.
H. Ditto.
i. An Entire Female Flower.
I. Ditto.
k. The Petals.
K. Ditto.
L. The Embryo, with its Pointal.
m. The globular Cluster of Seeds.
n. The Receptacle to which the Seeds are affixed.
O. A Seed.

The CORK TREE. *Quercus (Suber.)*

MONOECIA POLYANDRIA.

a. A Male Catkin.
b. *c*. The Calyx, in some quadrifid, and in some quinquefid in the Male Flowers.
B. C. Ditto.
d. An Entire Flower.
D. Ditto.
e. A single Stamen
E. Ditto.
f. The Female Flowers.
g. A single Flower.
G. Ditto.
H. A Vertical Section of ditto.
i. The young Acorn or Fruit.
I. Ditto.
K. A Vertical Section of ditto.

The STRAWBERRY TREE. *Arbutus (Unedo.)*

DECANDRIA MONOGYNIA.

a. The Calyx.
A. Ditto.
b. The Corolla.
c. The same cut open, to show the situation of the ten Stamina.
C. A single Stamen.
d. The Embryo with its Pointal, situated within the Corolla.
D. Ditto.
e. The Fruit.
f. A Transverse Section of ditto.
g. A Vertical Section of ditto.
h. The Seeds.

The YEW. *Taxus (Baccata.)*

DIOECIA MONADELPHIA.

a. A Male Flower.
A. Ditto.
B. The Calyx.
D. The Stamina.
E. Two Stamina, one viewed in front, the other on the underside.
f. The Female Flower.
F. Ditto.
G. The Calyx.
I. The Embryo, with its Pointal.
k. The Fruit, or Berry.
l. A Vertical Section of ditto.
m. The Seed.

The HOLLY. *Ilex (Aquifolium.)*

TETRANDRIA TETRAGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
e. The Embryo.
E. Ditto.
f. The Berry.
g. A Transverse Section of ditto, showing the Conceptacle.
h. The Seeds.
H. A Seed.

The HAWTHORN. *Cratægus (Oxyacantha.)*

ICOSANDRIA DIGYNIA.

a. An Entire Flower.
b. The Calyx.
c. The Petals.
d. The Stamina.
D. One Stamen.
e. The Embryo with its Pointal.
f. The three Pointals.
g. The Berry, or Fruit.
h. The Stone, containing the Kernel.

END OF THE FIRST VOLUME.

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