The taxonomy of oaks has advanced considerably from the early days when what we would now regard as from four to six different species constituted the range familiar to European botanists. Recent estimates of the number of species range from 400 to 600 – unless, of course, something startling is announced at this conference.

The history of the botanical study of oaks can be conveniently divided into three periods: those of European oaks, American oaks, and Asiatic oaks, in roughly chronological sequence. In this paper I will take you through these periods and look at the ways in which oaks have been regarded, and portrayed, in each.

The age of European oaks

The botanical literature on oaks effectively begins with Fuchs, in 1542. Those who are accustomed to thinking of Brunfels (Herbarum vivae icones, 1530) as the starting point of modern botany may be surprised to find him passed over; but Brunfels’ book is important for its illustrations, not its text. The little section on trees at the end of the work is not illustrated, and Brunfels’ page-long discussion of Quercus is little more than a rehash of recycled mediaeval gossip. No, it is in Fuchs’ De historia stirpium of 1542 that the first treatment of oaks with some botanical merit will be found – as well as the first botanical illustration of an oak drawn from life.

Let us look first at the illustrations, for without illustrations descriptive botany would never have got off the ground; and let us begin with a glance at woodblock printing and its characteristics. It is always useful to be reminded of the limitations of printing technology in any given period, to help us to judge the artists’ accomplishment properly. Fuchs’ herbal contains a non-botanical plate that makes the matter clearer: a group portrait of the artists he employed. Albrecht Meyer drew the plants; Heinrich Füllmairer copied Meyer’s drawings onto the woodblocks; Veit Rudolf Speckle carved the blocks. (This is the first time that the artists received their due in a botanical publication – and the last for a few centuries.) So, the important point to remember is that botanical illustrations in the 16th century were made by whittling a block of wood, so that a certain number of lines stood up above the rest of the surface; these projecting lines of wood received the ink and were pressed against the paper. The advantage is that the illustration can fit on the same page as the text, since woodblocks operate on the same principle as pieces of type; the disadvantage is that there is a distinct upper limit to the amount of detail you can whittle out of a wooden block.

This is very apparent in Fuchs’ illustration. This version comes not from the 1542 Latin edition, but from the abridged German translation that appeared the following year (because the Lindley Library’s copy is coloured). The lines in a Fuchs illustration were largely confined to outlines; there was little internal detail, no shading, little modeling; and this was deliberate, because the owners of copies were expected to have them coloured, and Fuchs did not want to fill the illustrations with detailed lines that were likely to be effaced by the colourists.
Fuchs' work was later reissued in a handy octavo format, and, the popularity of the genre thus established, publishers vied with each other for a share in the market for herbals. Competition, business deals, copying and outright piracy governed the botanical market just as they have governed other markets since. All these aspects of the publishing business can be demonstrated using illustrations of oaks.

First, copying and piracy: This we can see in the case of William Turner, the author of the first respected British herbal, in the 1560s. Turner's illustrations are copied from those of Fuchs, and exhibit a characteristic reversal. The copyist would open Fuchs to the right picture, and copy it onto the woodblock; when the woodblock was carved and placed in the printing form, it came out reversed left-to-right.

The two editions of Gerard's *Herball* present a much more complicated problem. The *Herball* was very much a publisher-led book. The proposal came from the Queen's printer, John Norton, who wanted to publish a good English-language herbal. His original plan was to commission a new translation of Dodoens' herbal (already translated in 1578), and accompany it with the best of recent plant portraiture. At the Frankfurt Book Fair, he saw the *Eicones plantarum* of Tabernaemontanus, published in 1590 by Nicolas Bassaeus; He arranged to rent the woodblocks for his proposed book, and a comparison between Gerard and Tabernaemontanus reveals that the illustrations were printed from the same blocks: Not only is there no right-to-left reversal, but when photocopied onto transparent acetate and overlaid, the two images correspond exactly. Any discrepancies are due to woodblock erosion or to touching of the paper during printing.

What about the text? For the translation Norton hired a London physician named Robert Priest. Priest died leaving the work unfinished; Norton found a replacement author in the barber-surgeon John Gerard. Gerard claimed never to have seen Priest's work, but to have begun the whole project anew; Agnes Arber, in her history of herbals, said that this statement 'can only have been a deliberate lie' (Arber 1986: 129). Gerard based his work on Mathieu de L'Obel's herbal, instead of Dodoens'; L'Obel was asked to make corrections, when the publishers expressed concern that some of the illustrations were being wrongly identified; but according to L'Obel himself, not all his corrections were accepted, and the work rushed into print before being fully amended. L'Obel retaliated by accusing Gerard of plagiarism.

Gerard has been defended on the grounds that the accusations of plagiarism were either anonymous or made by interested parties (Henrey 1975 I 145-7; Louis 1980: 269-74), and it is undeniable that there is much more in the *Herball* than can be found in Dodoens' original: locations at which plants have been found in England, observations made in Gerard's garden and those of his friends, and reports from correspondents. On the other hand, the fact that the text was fitted to a series of illustrations made on the continent helps to explain why the Turkey oak and cork oak appear in Gerard even though he acknowledged that they were not to be found in England.

In the early 1630s, a new edition of Gerard's *Herball* was commissioned - again a publisher-led enterprise, conceived in order to cut out a competitor: John Parkinson, whose *Paradisus terrestris* of 1629 had been a great success, and who was reported to be working on a new herbal to replace Gerard's. Norton's widow
and her colleagues commissioned Thomas Johnson, an apothecary who had published descriptions of his plant collecting in the environs of London, to revise the text; his enlarged and improved edition was published in 1633, with a further reissue in 1636. Botanists are uniform in praising Thomas Johnson’s revision as more accurate and less credulous than its predecessor. But what of the illustrations?

It is generally claimed in the literature that, as Bassaeus’ woodblocks had been rented for the first edition; blocks from Christopher Plantin of Antwerp were rented for the revision. Johnson claimed in his Preface to have ‘made use of those wherewith the Workes of Dodonaeus, Lobel, and Clusius were formerly printed’, and at the end, apologising for some out-of-sequence addenda, ‘This worke was begun to be printed before such time as we received all the figures from beyond the Seas’ (Gerard 1633: 1630). However, the Plantin-Moretus Museum has no record of such a loan of woodblocks taking place – and the fact that the book was reissued within three years would have required either a most extended loan period or a second loan, an event one would not expect to have been lost sight of. And a comparison of superimposed acetate copies reveals that the Gerard illustrations are all slightly smaller than the Plantin versions; they were not printed from the same blocks, but were copied. The fact that the majority of the illustrations show no right-to-left reversal indicates that the copying was a technically sophisticated process. I suspect that the Plantin illustrations were copied onto paper which was then treated with turpentine or an equivalent in order to make it transparent, so that the paper could be turned over for re-copying onto the blocks; and that the paper shrunk slightly in the process, thus accounting for the discrepancy in size. No single volume issued by Plantin contained all the illustrations copied; fully 1800 of them can be found in L’Obel’s Plantarum seu stirpium icones of 1581, but over 400 came from Clusius’ Rariorum plantarum historia (1601), a further 150 from Dodoens’ Stirpium historiae permutates sex (1583), and a smattering from other sources – including over 100 copied from the first edition of Gerard, but this time more cavalierly, with frequent right-to-left reversal.

During the course of the 17th century, woodblock printing was progressively superseded by copper-plate engraving as the preferred medium for high-quality plant illustrations, but the larger botanical encyclopaedias also continued to use woodcuts until the early 18th century, for reasons of space and cost. Probably the most important of 17th-century encyclopaedias was Jean Bauhin’s Historia plantarum universalis, published posthumously in 1650-51, as edited by Dominique Chabrey. Here, the sheer quantity of plants dealt with encouraged economy of presentation: the work was laid out in double columns, and woodcuts used to depict the plants regardless of scale. There are indications that Bauhin’s work was published in some haste. Its pagination is complicated, and it teems with pagination errors. There are evident gaps in the illustrations: some articles are unillustrated, and in one case there is a blank space accompanying the text entry. Bauhin’s illustrations were cribbed from a variety of sources: Plantin, Tabernaemontanus, and Fuchs.

Fifteen years after Bauhin’s work was completed, an abridged version was published by Chabrey under the title Stirpium icones et sciarographia (1666). Chabrey’s work is not as well known as Bauhin’s original, and when it is known is not as highly regarded, for fairly obvious reasons. The text is brief, providing
only thumbnail accounts of standard length for each plant, so as to cram the entire scope of Bauhin’s three volumes into a single one. Also, as a piece of book production, Chabrey’s work is disconcertingly poor: although it was published under prestigious auspices, the printers seem to have eked out a meager paper supply by using a variety of papers of different thicknesses and qualities. (Eleven years later, a ‘second edition’ appeared, made up entirely of unsold stock from 1666 with a new title page.) Nonetheless, anyone interested in Bauhin cannot afford to ignore Chabrey. The illustrations in the Scigraphia were printed from the same blocks used in Bauhin, and while sometimes they were printed upside down, and occasionally used for a different plant from the one assigned in Bauhin, they also include reworkings and additions that indicate that Chabrey was completing an unfinished process of editing. Previously unillustrated articles are fitted with images; where Bauhin has a blank space, the omission is repaired. One such addition is found among the oaks, where Bauhin supplied no illustration for Cerrus, and the woodcut duly appears in Chabrey.

Such was the world of botanical publishing in which our earliest treatises appeared. By this time certain peculiarities of the pictures of oaks you have seen may have struck you. Most of the plants in Fuchs were depicted at life-size: but while a large quarto or folio volume allows most herbaceous plants to fit on the page at natural size, things are different when it comes to trees. (It is probably this consideration that led to the omission of pictures for the trees in Brunschel.) In order to depict a tree in a small compass, one could portray the tree as a whole – but a study of its habit would lack the anatomical details necessary for identification; or one could depict a fragment of the tree only, such as a portion of stem with characteristic foliage – but the reader would then get little idea of the tree as a whole, for identification at a distance. The first option was followed by nobody in the sixteenth century. The second option was taken up by Adam Lonitzer (a hack compiler, but possibly the most reprinted of all Renaissance authors on botany); Mattioli; Parkinson – this is the work whose rumoured progress sparked the revision of Gerard’s Herball, and which finally appeared in 1640 as Theatrum botanicum – and by the botanists working with Plantin. But some works, beginning with Fuchs, compromised by presenting a stylised outline of a tree, a portion of which is expanded into the detailed fragment. The results are exceedingly un-lifelike, and could only have been understood by convention. Johannes Jonston’s Dendrographias (1662), like Bauhin and Chabrey cribbing merrily from all the earlier sources available, gives a handy anthology of all the conventions in a single page; the illustration taken from Fuchs appears without right-to-left reversal, so it was presumably copied from Turner or some other intervening source who had reversed it in the interim.

Virtually all the illustrations discussed so far have a decidedly rectangular format. When one is carving standardised blocks of wood, it is difficult not to adapt the carving to the shape of the blocks, and produce illustrations in which the images themselves becomes rectangular. This tendency carried over into the larger blocks used for large quartos and folios as well; There was no particular reason for the illustrations in Mattioli’s commentary on Dioscorides to cover the page with such repetitive elaboration that serves no additional diagnostic purpose.

How many species of oaks did the authors of this early period recognise? For the earliest writers, the nomenclature of oaks was derived from Pliny, Theophrastus, and Dioscorides, and the Greek and Latin names were
treated as primary; so in addition to *Quercus*, *Ilex*, *Cerrus* and *Suber*, we find *Glands*, *Phellodrys*, *Hemeris*, *Aesculus*, and *Galla*. Not that this dependence did not bring its own problems, for it has been argued that Pliny misunderstood Dioscorides and confused the holm oak and the yew (Riddle 1985: 16).

The earliest of our authors, from Brunfels to Mattioli, limit their discussions to a generic level, and speak simply of *Quercus* or *Ilex*. But with the rise of the Clusius, L'Obel, and Dodoens, attempts began to be made to distinguish species or varieties within those larger categories. By the 1620s, names in use for taxa had become so numerous that the first dictionary of synonyms appeared: Gaspar Bauhin's *Pinax*; the problem was that Bauhin's names eventually became one more set of synonyms to remember. There was as yet no agreed terminology for classification, no rationale for distinguishing genera and species, certainly no higher-order groupings. Nonetheless, it is noteworthy how many of these early authors keep the oaks grouped together even though there is no common Latin vocabulary to govern them. The trees may be named *Quercus*, *Cerrus*, *Ilex*, *Phellodrys*, and *Suber*, but they still cluster together in the text. In most cases *Castanea* and *Fagus* will be found nearby – indeed, in Mattioli and others, *Fagus* is interposed between *Quercus* and the other oaks. Those who favour Scott Atran's recent claims for the intuitive nature of most plant groupings will no doubt be reinforced by these suggestions that the concept of Fagaceae was simmering just below the level of consciousness. (Atran 1990)

Continental and Mediterranean oaks began to be introduced into Britain in the 16th century. The holm oak was the first to arrive; Clusius reported seeing one growing at Whitehall in 1581, and Gerard confirmed that there were other scattered specimens by 1597 (Clusius 1601: 23; Gerard 1597: 1161). The Kernes oak probably arrived in the 1680s; the cork oak and evergreen oak (probably the holm oak, for the Turkey oak may not have reached Britain until the 18th century) were being offered by William Lucas as early as 1677 (Harvey 1972: 23). Other Mediterranean species trickled in throughout the 18th and early 19th centuries, especially Iberian oaks, which the discouragement of travel in pre-Napoleonic Spain kept from view.

**A note on galls and mistletoe**

It is not only beeches and chestnuts that accompany the oaks in the early herbals. Galls and mistletoe form part of the same clusters of entries, partly one supposes on practical and economic grounds – the target audience for herbals was after all the medical profession – but also on quasi-taxonomic ones. The types of galls were treated as more useful diagnostic signs than sessile or pedunculate fruits, and as the 16th century progressed, the itemisation of different types of galls proceeded much more rapidly than the discrimination of oak varieties. William Turner, incidentally, made an astonishing statement in his *Herbal*: 'I have not sene any galles in England growing upon oak leves. But I have sene them not only in Italy, but also in great plenty in East Freseland.' Canon Raven thought that this passage indicated the limits of Turner’s intellectual powers (Raven 1947: 90), but it has been suggested that Turner was thinking specifically of the galls used to make ink, for he goes on to suggest that 'it were wel done, to fetch som from Freseland and to plant them in some hote sunnye place in England' (Turner 1568 ii 109; Robbins 1993). The diagnostic use of galls fell
away after the late 17th century, after Malpighi demonstrated that galls were caused by insects; though English publications did not note this fact before Withering in the 1770s.

The inclusion of mistletoe is harder to justify on any terms other than those of received tradition. Pliny had told of the Druids, and their religious use of branches of mistletoe harvested from oak trees; he was under the impression that mistletoe grew commonly on oak. But by the late sixteenth century, commentators, especially English ones, were expressing polite skepticism about the frequency of this occurrence, though this did not stop them from treating Mistletoe immediately after Oak, instead of near trees it frequented more.

Ethnographers eventually concluded that the Druids’ enthusiasm for oak-grown mistletoe was a consequence of its rarity, but before that time there was frequent debate over whether mistletoe could grow on oaks at all. The conclusive demonstration was made by the redoubtable Donald Beaton, at the time head gardener at Haffield House in Herefordshire, when he exhibited a mistletoe growing on an oak branch at the Horticultural Society in 1837 (Beaton 1837). The Woolhope Club, that curious natural history organisation devoted to the cider districts of the west country, undertook a survey in 1870, and concluded that only nine oaks were known to bear mistletoe, though others had done so until their recent felling. Once the capacity of (some) oaks to bear mistletoe had been demonstrated, it was not long before attempts were made to cultivate it deliberately. Francis D. Horner, better known for his work with florists’ flowers, began growing mistletoe in the 1860s, and forty years later reported that he had only once got it to grow on oak (Mosley 1910: 84-93).

The age of American oaks

Leonard Plukenet was able to illustrate American – or as he called them Virginian – oaks in the 1690s, but the first American oak whose introduction into Britain can be well dated was Quercus coccinea, which arrived about 1690. It was followed by Quercus nigra and Q. marilandica by the 1720s; Quercus alba was introduced about the same time, but has never done well in this country and has been re-introduced or re-attempted at various intervals since. The 1730s saw Quercus phellos, and others followed in the later 18th century. Joseph Allerton’s nursery at Knightsbridge was one of the first to make a specialty of importing American oaks, in the 1730s. In the last quarter of the century the action shifted to Leytonstone, where at least three nurserymen played a prominent role: James Fraser, who was offering Quercus imbricaria by 1786; James Hill, who built up a collection of red oaks which was still admired in Loudon’s time half a century later; and Spencer Turner, though he is best remembered for raising one of the first commercial hybrids, Quercus x turneri. By the 1770s, there was a flourishing trade, as we can tell from a statement made in 1776 by William Speechly, the head gardener at Welbeck in Nottinghamshire: ‘I have several times made trial of twelve or fourteen kinds of American oaks sent over to his Grace in great quantities’ (Evelyn 1776: 97).

In 1730 the Catalogus plantarum of the Society of Gardeners recognised ten species of oaks, six of them American; in 1753, Linnaeus recognised 14 species, only five of them American (Q. phellos, prinus, nigra, rubra, and alba). Since the Catalogus gave two different white oaks, they may have been varieties only.
Linnaeus' treatment was not without its problems. As was his wont, he adopted some of the traditional Greco-Latin names as specific epithets, so that the ilex became *Quercus ilex*; but he then felt free to use *Ilex* as the generic name for the hollies, reducing their traditional name, *Aquifolium*, to the status of a specific epithet. Another traditional name, *Aegilops*, was similarly turned into *Quercus aegilops*, but to describe the result I can do no better than quote the latest edition of Bean: 'Linnaeus' account of this species is so confused that most botanists have rejected the name as of uncertain application, though there can be little doubt that it was intended for *Q. macrolepis* or one of its allies. Mme Camus adopts the name and under it distinguishes seven subspecies, but she did not venture to suggest which of these was *Q. aegilops sens. strict.*' (Bean 1976: 495).

Linnaeus' description of *Quercus robur* is too vague to allow it to be distinguished from *Quercus petraea*, though eventually, in the second edition of his *Flora Suecica*, he treated the sessile oak as variety b of *Quercus robur*. William Hudson popularised this treatment of the two oaks in his *Flora Anglica* (Hudson 1762: 359), but Philip Miller sowed further confusion when he adopted the Linnaean nomenclature in the eighth edition of his *Gardener's dictionary*; he used *Quercus robur* for the sessile oak, and renamed the pedunculate oak *Quercus foemina*. In this he was followed on the continent for several decades, e.g. by Willdenow, but fortunately not much in England. But thanks to the efforts of Miller, Martyn, Smith, Salisbury, and others, both the trees now identified as *Quercus robur* and *Quercus petraea* have been referred to as *Quercus pedunculata* in the earlier literature. (Gardiner 1974: 14).

But the major drawback to Linnaeus' treatment lies in the higher-order classification. The late 17th and early 18th centuries had seen the first significant efforts to produce systematic classifications of the plant kingdom, and Linnaeus', first propounded in the 1730s and solidified by the achievement of the *Species plantarum* in 1753, was the most widely adopted throughout Europe. Its taxonomy has not survived as well as its nomenclature, however. Acting on the principle that it was the sexual organs that ought to be the basis of classification, Linnaeus grouped plants according to the numbering, relative position, and separation of the stamens. Plants whose flowers bore a single stamen were grouped into Monandria, those with three stamens into Triandria, and so on. This system was adopted internationally with great speed, and especially in Britain lingered for generations, precisely because it was so simple to learn and remember; much of the history of early 19th-century taxonomy is the story of rebellions against Linnaeus, and his eventual supersession. Oaks, in Linnaean classification, formed part of the natural order Monoecia polyandria - along with *Fagus*, it is true, and *Juglans*, but also *Poterium, Sagittaria, Platanus*, and *Liquidambar*.

By the time of Willdenow's revision of the *Species plantarum* at the end of the century, the number of recognised species had grown from Linnaeus' 14 to 76, and Willdenow thought it was time to introduce some sub-generic divisions. But here he was handicapped by his master's principles: after the sexual organs, leaves tended to come next as criteria for classification, so Willdenow arranged the known oaks in five groups according to their leaf shapes: entire, toothed, lobed, sinuate with mucronate lobes, and sinuate without mucronate lobes (Linnaeus 1797-1830: IV 423-54). This classification was widely adopted, by James Edward Smith and the 'Nouveau Duhamel' among
others. But by the 1830s John Claudius Loudon could remark: 'We do not mean to say that this arrangement is without its use; but we think it decidedly inferior to one in which the species are thrown into groups according to a totality of characters' (Loudon 1838: 1729). There speaks the 19th century, with its goal of replacing Linnaeus' artificial system with a natural classification that would take all parts of the plant into consideration. But as, for reasons shortly to become apparent, that totality of characters was not yet botanically available, Loudon in his own work adopted a handy division into deciduous and evergreen species.

Part of the problem with Willdenow's attempt was the variability of foliage; in the more modern classifications, similar leaves can occur in widely different sections. But of more immediate impact was the problem of the American species. Once again, let us listen to Loudon: 'Till the oaks of America began to attract the notice of botanists, the European species occasioned comparatively little difficulty. The American sorts, however, vary so exceedingly in their leaves at different seasons of the year, in different stages of their growth, and in different localities, that it is next to impossible to fix on a specific character, taken from them, which shall remain constant. The descriptions of the American oaks which have been published are, consequently, of very little use, without figures; and even the figures differ exceedingly in different authors... not to speak of ... works published on American oaks by botanists who have not been in America' (Loudon 1838: 1729).

The botanist who brought this problem to general awareness was André Michaux, whose Histoire des chênes de l'Amérique was published in 1801, with 32 uncoloured engravings by Pierre Joseph Redouté, and four by his brother Henri Joseph. In his preface, Michaux explained that 'the greater part of those which grow in America appear under such diversified forms when they are young, that we cannot be certain what they are until they have arrived at maturer age, or have got their full growth' (Michaux 1801: page; translation care of Savage 1986: 184). Michaux was still in thrall to Linnaeus, and so it is primarily the leaves that are illustrated, a fact which somewhat limits the work's usefulness to the botanist; but to show the depth of the problem, Michaux provided two plates for most of his oaks, one showing the mature foliage, and one the juvenile.

Michaux's book was well received, and an incomplete German translation appeared in 1802-4, which I have not seen, but is cited by Staffle as having coloured plates, though the publisher announced the availability of uncoloured copies. (Staffle 5957) Michaux's son François followed his father by producing a larger treatment of eastern American forest trees. This, the first classic of American forestry, was published in three volumes in Paris in 1810-13, as Histoire des arbres forestiers de l'Amérique septentrionale. The portion dealing with oaks was separately published in 1811, and translated into German in 1842. The entire work was translated into English as The North American sylva in 1817-19, with two immediate re-issues, and three posthumous editions edited with annotations by Thomas Nuttall and others. As a result of the works of the Michaux, it became apparent to botanists that America was full of 'dwarf, stoloniferous, or creeping oaks' (Loudon 1838: 1718), which corresponded to nothing familiar in Europe, and presented taxonomic difficulties.

Again, François Michaux's book has illustrations by Redouté, found in both coloured and uncoloured copies. Redouté was the greatest master of engraved texture that botanical art has seen, and even in a commercial production
like Michaux, over which Redouté could exert little artistic control, the quality of his treatment of leaves is apparent. Engraving continued throughout the 19th century, but increasingly the various forms of lithography, which allowed a uniform texture instead of a multiplication of dots or lines to provide modeling, superseded it. The zinc lithographs in Loudon's Arboretum et fruticetum Britannicum are a representative example of British work in uncoloured lithography, with image standards heavily derived from the preceding tradition of engraving. Probably the most beautifully illustrated of all works on oaks was Karl Kotschy's Eichen, published in eight folio parts between 1858 and 1862, and containing 40 chromolithographed plates by Joseph Seboth and J. Oberer. Although it is confined to the European and Mediterranean species, no better oak portraits have been published: detailed dissections complement specimen branches whose foliage is portrayed in all its complexity. Chromolithography is generally not as highly regarded as hand-coloured engraving as a means of presenting subtlety in colouring, but with a sufficient number of stones good results could be obtained, and the superiority of the Kotschy plates over the Redouté plates for Michaux in terms of taxonomic value will readily be seen.

New American species continued to arrive in England throughout the 19th century. David Douglas sent Quercus garryana at the beginning of the 1830s; at the end of that decade, another Horticultural Society collector, Theodor Hartweg, sent Quercus crassipes, Q. reticulata, and others that lasted less well (e.g. Q. agrifolia) from Mexico. John Jeffrey, working for the Oregon Association, sent Q. sadleriana at the beginning of the 1850s, though it was not described until 1871. More Californian species arrived at Kew in the 1870s: Q. kelloggii, Q. lobata, and Q. wistizeni. By this time the Americans themselves were beginning to produce respectable surveys of their native flora; Albert Kellogg's collections were published by Edward L. Greene under the title Illustrations of American oaks in 1889, and two years later Charles Sprague Sargent launched his massive Sylva of North America, whose treatment of American oaks was the most substantial survey until the 20th century. Sargent's illustrator was Charles Edward Faxon, highly praised for the softness of his line, balanced against his botanical accuracy. But comparable work in line was also being undertaken in England, for example in Miss E. Goldring's illustrations for the early editions of Bean's Trees and shrubs hardy in the British Isles.

The age of Asiatic oaks

The establishment of the Calcutta Botanic Garden, and the Buitenzorg Botanic Garden in the Dutch East Indies, created the conditions from which the abundance of Asiatic oaks could impinge on the European botanical horizon. Wallich and Royle found twelve species in India, and Blume sixteen in Java, which their various writings made known to the West during the first quarter of the 19th century. By 1838, Loudon was calculating that there must be 150 species, 100 of which remained to be introduced into Britain by that time; he expected that they 'would probably all live in the open air in the climate of London' (Loudon 1838: 1722). The first species to arrive in Europe had been Quercus glauca, sent from Nepal in 1804, and re-introduced 60 years later via Kew. In the 1850s and 1860s, Robert Fortune brought Quercus myrsinifolia and Q. variabilis; Charles Maries collected Quercus acuta for the Veitch nurseries in 1878, and their later collector E.H. Wilson brought several Chinese species at the end of the century.
The arrival of the Asiatic oaks stimulated new efforts in classification. De Candolle, in his *Prodromus* (De Candolle 1864), divided the 281 species of oaks he recognised into six sections, one of which (Lithocarpus) has generally been treated as a distinct genus since. The other sections were Lepidobalanus, Cyclobalanus, Androgyne, Pasania, and Chlamydobalanus, the last two entirely consisting of Asian species; the divisions were based on a variety of fruit and flower characters ranging from the form of the style to the pattern of scales on the acorn cups. Since then, botanists like Trelease and Oscar Schwarz have tackled the oaks of different geographical areas, each making alterations to the system based on their local populations. Despite the fact that Schwarz’s classification was adopted in *Flora Europaea*, I think it is safe to say that the two most widely used systems today are those of Prantl and Camus — because they were adopted, with minor amendments, by Krüssmann and Bean in their respective surveys of trees in cultivation (Krüssmann 1986; Bean 1976).

Prantl’s survey cannot be called monographic, and covers only a few pages; it formed part of the massive collaborative work he co-edited with Adolf Engler, *Die natürlichen Pflanzenfamilien*, and appeared in 1887. Prantl abandoned three of De Candolle’s groups, and divided the oaks into three sections of equal status: Cyclobalanus, the evergreen species in which the scales on the acorn cups are arranged in concentric rings; Erythobalanus, the American red oaks and willow oaks; and Lepidobalanus for all the rest (Prantl 1887).

Aimée Camus wrote monographs on *Salix* and *Castanea*, and had a particular expertise in the east Asiatic flora; in the 1930s she treated several families for Lecomte’s *Flore Indochine*. But her magnum opus was *Les chênes: monographie du genre Quercus*, published as part of Paul Lechevalier’s *Encyclopédie economique de sylviculture*. The initial publication date is often given as 1936, but the first part of the illustrations appeared in 1934. Over a twenty-year period, the work grew into three fat octavo volumes (including a treatment of *Lithocarpus*), with three accompanying portfolios of illustrations.

Camus, like Prantl, made the presence or absence of concentric rings of scales on the acorn cups the major distinction between divisions. Both make Cyclobalanus (or Cyclobalanopsis), a separate division. Prantl distinguished two sections among the remaining oaks: Erythobalanus and Lepidobalanus; Camus subsumed both into a subgenus Eucheirerus, giving Erythobalanus equal status to groups that Prantl had made into subsections. And thereafter there are frequent differences between their groupings of species into small taxa.

The illustrations in Camus were drawn by her sister Blanche, an artist of considerable talent, and reproduced by photolithography, a medium very handy for publishers but in those early days less rewarding for the botanical artist. The variety of oak species had now become so great (430), and so many of them were not known in cultivation but from herbarium specimens alone, that many appear only as part of composite plates, the leaf frequently being the major diagnostic character depicted. But for the long-established and long-cultivated species, several plates are devoted to exhibiting ranges of morphological variation: in leaves, in acorns, not to mention juvenile forms. Composite plates have since the 19th century become one of the major forms of botanical illustration, as the handy one-volume identification guide has flourished as a genre; to bring us more or less up to date, let me single out Ian Garrard’s illustrations for the late Herbert Edlin’s *Tree key*, as splendid examples of how to convey a large amount of necessary information in a small compass.
Oaks as specimens, individuals, ecosystems

Loudon, in his *Arboreetum*, had depicted some particular named specimens as well as typical forms of the species. The emergence, toward the end of the 19th century, of photography as a means of book illustration augmented the tendency to depict individuals: after all, individuals are all one can photograph. Books such as Elwes and Henry's *Trees of Great Britain and Ireland* (1906-13) and, more profusely, Max Lange's *Unsere deutschen Eichen* (1937), with sixty trees each photographed in winter and summer, offered splendid ranges of photographs of individual trees, and no doubt helped to focus attention on the issue of variation. However, Lange's book, tastefully dedicated to Field Marshall Goering, was offered not so much as a contribution to botany as a celebration of 'the German national tree, the folk-tree'. And while in England the oak may not have had quite such a layer of nationalistic fervor hung from it, its cultural importance nonetheless intruded into botanical and horticultural treatments of it.

In England as well as Germany, various individual oaks had become celebrated as historic and veteran trees: King Charles' Oak at Boscobel, in which the fleeing king had hidden; the Abbot's Oak at Woburn, on which the abbot had been hanged; gospel and parliament oaks in various parts of the country. From the 1770s to the 1790s, the enthusiastic amateur Hayman Rooke measured and drew striking oaks on the Welbeck estate, publishing a book on the subject in 1790. One of the most striking was 'a view of the famous green dale oak, thought to be above seven hundred years old' – somewhat truncated by the time Rooke was observing it. Other books in the early 19th century devoted attention to historic oaks, notably H.W. Burgess's *Eidodendron* in 1827, and Mary Roberts' *Ruins and old trees* in the 1840s (Burgess 1827; Roberts n.d.).

All this emphasis on what might be called the cultural importance of oaks may have affected perceptions of its ecological status. Even Loudon begins his discussion of *Quercus* in his *Arboreetum* by a comparison of the oak and the lion as the kings of their respective kingdoms (Loudon 1838: 1717). So as the discipline of ecology slowly developed in the late 19th and early 20th centuries, and the idea of succession was formulated and widely adopted, oak forest was seen as the culmination of ecological development in England. Tansley, the most important authority on British ecology in the first half of the 20th century, gave detailed consideration to other types of woodland, but still regarded oakwood as the final phase to which all previous ones tended (Tansley 1939, 1949).

Twenty years ago I was on the advisory committee for a park which will remain nameless; when it was reported that the swamp cypress was dying and needed replacement, the chairman, remarking that it was an ugly tree and shouldn't be replaced, capped his argument by saying, 'What we want is native English trees: oak climax woodland!' Such was the state of popular ecology at the beginning of the 1980s. Then, within a very few years, the idea of a single, uniform ecological succession was superseded by the idea of ancient woodland, as the studies of Oliver Rackham in particular accustomed the public to the fact that the dominance of oak in British woodlands was a cultural, rather than a natural, phenomenon: human beings favoured the oak because of its utility for building, coppice, and other purposes (Rackham 1974). Oak has now been reduced from the king of trees to a more democratic role as merely one of the most frequent locally dominant trees, in a patchwork of plant communities in which lime, alder, birch, beech, and others dominate their respective areas.
Bibliography

Bauhin, J. 1650-51. Historia plantarum universalis. (Geneva: Samuel Chouet?)
Schwarz, O. Quercus, in Flora Europaea, 1: 61-4.

* Note on Bauhin: the title pages of 1650-51 give the place of publication as Yverdon, but do not supply the publisher's name. The Lindley Library copy has an additional title page dated 1661, and giving the publisher as Samuel Chouet of Geneva. This could indicate a re-issue by a different publisher; but, in view of the confused and complicated printing of the work, it could be that Chouet was involved from the beginning.