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Identifying British Elms *Ulmus*

Brian Eversham v. 4.0 July 2025

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Identifying British Elms *Ulmus*

Part 1: Introduction and Keys

Brian Eversham **v. 4.0** **July 2025**

Introduction

The classification of elms, the genus *Ulmus,* in books on the British flora has ranged from one variable species, to two, three, five or seven species, often with named hybrids and varieties. Peter Sell & Gina Murrell's new *Flora of Great Britain and Ireland*, volume 1, published in March 2018, treats each of 62 recognisable forms as separate named species, based on the Jayne Armstrong's (1992) Cambridge PhD thesis, supervised by Peter Sell. Sadly, Armstrong seems to have ceased botanical research a few years after her PhD, Peter Sell died in 2013, and Gina Murrell had retired, so this and volume 2 of the *Flora* was brought to press by four distinguished editors (A.O. Chater, R.G. Ellis, P.H. Oswald and C.D. Preston) five years after the death of Peter Sell. The book includes original descriptions of 40 species new to science, and eight existing varieties, hybrids or cultivars are raised to species level, under the authorship of Armstrong & Sell. I've spent my weekends and evenings since the summer of 2018 trying out that classification.

Living in Cambridgeshire is ideal for this, as we probably have the highest diversity of elms in Britain (and possibly the world – see below), and elms remain abundant, some of the commonest roadside and hedgerow trees. The Cambridge University Herbarium contains the type specimens of 48 of the 62 species, and over a thousand other specimens collected by Jayne Armstrong. It has at least as many collected by Peter Sell over the 70 years he worked in the herbarium, many from Cambs and adjoining counties, plus a large number of specimens from previous elm specialists, re-identified by Peter Sell. So, a good place to start.

Elm classification and naming

The history of elm classification and naming in Britain has been controversial and unresolved. A quite pithy review of the history of names and biology, which ultimately advocates a multispecies approach, is provided by Armstrong & Sell (1996), who wrote of "a legacy of taxonomic incalcitrance exacerbated by the vociferous disagreements of the two former elm specialists, Melville and R H Richens, so that elms are usually overlooked or regarded with despair."

Ronald Melville (1903-1985), the earlier of the two leading British 20th century elm specialists, was renowned for his work on the value of vitamin C in rose-hips during World War II, and later for compiling the world's first Red Data Book, in 1970. He was based at the Royal Botanic Gardens, Kew, and he recognised about 7 distinct species of elm in Britain. He believed that our elms have hybridised freely, so he named large numbers of different forms, including several putative three-species hybrids. The results of his work can be seen in the major herbaria, where he identified or re-identified thousands of elm specimens.

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Richard H Richens (1919-1984) was the Director of the Commonwealth Bureau of Plant Breeding and Genetics in Cambridge, and author of the first International Code of Nomenclature for Cultivated Plants. He studied elms throughout England, but especially in the East, for 25 years, and in France on family holidays over a similar period. He eventually concluded that there were just two variable species which he called *U. glabra* and *U. minor* and a hybrid between them which he called *U. x hollandica;* everything else he considered to be within-species varieties. In Richens's final thoughts on the subject, a substantial book which was published in 1983, he argued that only Wych Elm, *U. glabra,* was native, and postulated a complex series of introductions with human settlers from the late Neolithic, through the Bronze and Iron Ages, to the Romans and Anglo-Saxons, each arriving with their favourite elms, to explain the current distributions of the many variants of RIchens's *U. minor*. He regarded elms as *cultivars* rather than natural varieties, subspecies or species, because he argued they were all deliberately planted by people.

The current Elm referee for the Botanical Society of the British Isles, Dr Max Coleman, of the Royal Botanic Garden, Edinburgh, largely follows Richens's approach. In 2009, he wrote: "The advent of DNA fingerprinting has shed considerable light on the question [of elm species]. A number of studies have now shown that the distinctive forms that Melville elevated to species and Richens lumped together as field elm are single clones, all genetically identical, that have been propagated by vegetative means such as cuttings or root suckers. This means that enigmatic British elms such as Plot Elm and English Elm have turned out to be single clones of field elm. Although Richens did not have the evidence to prove it, he got the story right by recognising a series of clones and grouping them together as a variable species."

To be fair to Sell, Murrell, Armstrong and Stace, who all recognise more species than Coleman, the DNA work to date has been patchy and limited, both in the number of kinds of elm which have been sampled, and in the small part of the elm genome which has been studied. This is understandable: analysing a limited part of the genome costs around £100 per sample (2025); whole-genome sequencing still costs £2-3000 per sample. Until the costs come down, or the perceived value of elms goes up, we will not have analyses of full genomes for most elms. And many plant taxonomists point out that samples of DNA are just another useful set of characters to use in deciding on the status of taxa: like other features they are subject to individual interpretation - how different do two trees have to be before we call them separate species? - and are not the final absolute truth. I'd also argue that quite a few of the new elm species are actually quite variable in many features, which I suspect does not fit with them being single clones. See below for more information on elm diversity and genetics.

The standard British Floras over the last 70 years have reflected these various approaches. The key and descriptions in Clapham, Tutin & Warburg ('CTW') in 1952 appears largely to have been written by Melville, and is useful as a clear statement of his approach: it includes **7 species, 2 subspecies, 3 varieties 3 hybrids,** a total of **15 taxa**. By the time of their second edition, Clapham, Tutin & Warburg (1962) simplified this view, and Clapham, Tutin & Moore ('CTM') in 1987 adopted Richens's **2 species** view. Stace (1991, 1997, 2010, 2019), the *Flora* which many actively-recording botanists rely on, takes a middle route, currently including **7 species, 5 subspecies, 7 hybrids,** a total of **19 taxa**. The taxa they recognise are as follows:

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CTW (1952)	CTW (1962)	CTM (1987)	Stace (1991)	Stace (2019)
U. carpinifollia	*U. carpinifollia*	*U. minor*	*U. minor, ssp. minor, ssp. sarniensis, ssp. angustifolia*	*U. minor, ssp. minor, ssp. cornubiensis ssp. sarniensis, ssp. angustifolia*
U. coritana			(mentioned under *minor ssp. minor*)	(mentioned under *minor ssp. minor*)
U. coritana var. rotundifolia				
U. diversifolia				
U. glabra ssp. glabra	*U. glabra ssp. glabra*	*U. glabra*	*U. glabra ssp. glabra*	*U. glabra ssp. glabra*
U. glabra ssp. montana	*U. glabra ssp. montana*		*U. glabra ssp. montana*	*U. glabra ssp. montana*
U. plotii			*U. plotii*	*U. plotii*
U. procera	*U. procera*		*U. procera*	*U. procera*
U. stricta				
				U. laevis
			U. glabra x procera	…….
U. carpinifolia x glabra			*U. glabra x minor*	*U. glabra x minor*
U. glabra x plotii			*U. glabra x plotii*	*U. glabra x plotii*
U. x hollandica var. hollandica	*U. x hollandica var. hollandica*		*U. x hollandica*	*U. x hollandica*
			U. x hollandica var. insularum	…….
U. hollandica var. vegeta	*U. hollandica var. vegeta*		*U. x vegeta*	*U. x vegeta*
			U. procera x minor	*U. procera x minor*
			U. procera x plotii	*U. procera x plotii*
			U. minor x plotii	*U. minor x plotii*
7 species **2 subspecies,** **3 varieties** **3 hybrids** **Total 15 taxa**	**3 species** **2 subspecies** **2 varieties** **1 hybrid** **Total 8 taxa**	**2 species** **Total 2 taxa**	**6 species** **4 subspecies** **1 variety** **8 hybrids** **Total 19 taxa**	**7 species** **5 subspecies** **7 hybrids** **Total 19 taxa**

I have arranged the names as if there is equivalence, but the interpretation of names probably differs between each work. As if to signal the confusion, Stace uses one set of names in his key, but adds extra species names (*carpinifolia, coritana*) in his illustrations and text.

Stace's latest view (2019) still follows this middle-ground, notes that Sell & Murrell's multi-species approach has been published, suggests that 44 of their new species would fall within his *Ulmus minor ssp. minor,* but says that it is a thorough and robust analysis of the variation within smooth-leaved elms.

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A very different approach came from Oliver Rackham (1986) who classified elms based on what he thought were their origin: fashion elms (plantsmen's varieties), traditional elms (linked to a geographical area) and evolution or Lineage elms (very local elms different from the other two types). He also talked about invasive (rapidly suckering) elms and woodland elms (which do not sucker). Rackham (2006) remarks 'There are arguably more kinds of elm in England than of all other native trees together' and elsewhere regarded *Ulmus* as 'the most critical genus in the British flora' so ranking alongside dandelions, brambles or marsh-orchids.

It is unfortunate that Sell & Murrell, comprehensive in many ways, does not list many synonyms, so it's hard to tell where their names fit in previous and alternative classifications. There is an online source of synonyms for plants, maintained by the Royal Botanic Gardens, Kew: http://www.plantsoftheworldonline.org which includes nearly all the elm names I use in this guide. It recognises only three species and one hybrid as being valid: *Ulmus glabra, U. laevis, U. minor* and *U. x hollandica.* It disagrees with Stace over the placing of Sell & Murrell names (Stace thinks that 44 of Sell & Murrell's names fall within his *Ulmus minor* subspecies *minor* and I think that's probably about right). It also puts very different elms in each category and separates some very similar ones (*U. procera* is listed as a synonym of *U. minor,* but the almost identical *U. proceriformis* is listed as *U. x hollandica*). The number of taxa included in each broad species is as follows:

Ulmus glabra	5 taxa
Ulmus laevis	1 taxon
Ulmus minor	12 taxa
Ulmus x hollandica	44 taxa

U. x hollandica is usually interpreted as the hybrid *U. glabra x minor.* Most of Sell & Murrell's new species are smooth-leaved and quite small-leaved, unlike *U. x hollandica*. If nothing else, this disagreement between Stace and Kew illustrates why Melville's preferred approach of naming a large number of 2- and 3-species hybrids would be confusing and difficult for newcomers to learn.

At some stage I would like to produce a key to broader groupings of elms, with finer subdivisions than Stace's but simpler than the 62 species in Sell & Murrell. In the meantime, I have produced a diagram and a synonymic checklist (on pp. 58) which relates the microspecies to 'Stace species' (and highlights a few which seem to have been overlooked by previous workers). I've also drafted a Stace: Sell & Murrell synonymy, and have published a version in an account of Cambridgeshire elms (Eversham, 2023). So far I've not found a reliable way to separate these groupings with a key, but if a description like 'Smooth jagged-leaved species' is clear to you, you can start with the grouping and skim the descriptions and illustrations of that set of species.

For seven species, the names used by Armstrong in her PhD thesis (1992) were slightly different from the names published in Sell & Murrell (2018), and you may encounter these online (e.g. photos from Cambridge herbarium) or in lists and publications which were influenced by Armstrong or Sell between 1992 and 2018:

Name in Armstrong (1992)	**Current name from Sell & Murrell (2018)**
Ulmus coriifolia	*U. coriaceifolia*
Ulmus dentata	*U. multidentata*
Ulmus longicauda	*U. longicaudata*
Ulmus microdens	*U. microdon*

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Ulmus obovata	*U. pseudobovata*
Ulmus proceriforme	*U. proceriformis*
Ulmus pseudoelegantissima	*U. pseudelegantissima*

In some cases, I think the original manuscript name may have turned out to have been used previously for a different elm (for instance, *dentata* and *obovata* are synonyms of *U. americana* from Rafinesque (1783-1840), which would have been difficult to discover in the 1980s without the internet), so was not available. For *longicauda, proceriforme* and *pseudoelegantissima,* the published name is better Latin or an improvement to the structure of the scientific name.

Global elm diversity and genetics

Elm species occur across North America, Europe and temperate Asia. Most previous works have suggested there were 30-40 elm species in the world. Asia is usually considered to have the highest diversity of elms, with around 20 species (e.g. Fu, Xin and Whittemore, A., 2002).

There has been one recent global study on elm genetics, by Whittemore *et al.,* (2021), based on a technique known as Restriction site-associated DNA sequencing (RAD-seq), where a carefully selected subset of the genome which is particularly useful in plant taxonomy, is sequenced. This analysis showed the comparative relatedness of 35 recognised elm species and subspecies across North America, Europe and Asia. The authors were able to produce a 'family tree' of world elms, and show the genetic distance between them. They found as much genetic distance between certain variants of '*Ulmus minor*' in Britain as between several of the fully accepted Asiatic species.

Genetics of British elms

Previous studies have looked at one or two elm variants in detail, which suggested, for instance, that Plot Elm, *U. plotii,* was a single clone (Coleman *et al.,* 2000). Given that it is widespread from eastern Wales, through the Midlands and into East Anglia, one must assume this has been transported and planted by people. In view of its very distinctive columnar growth form, almost like a Lombardy poplar with a floppy top, this is plausible.

I am involved with an ongoing project funded by Natural England under their Species Recovery grant scheme, to provide DNA data for all the British elms. Alex Prendergast (Natural England), Cicely Marshall (University of Gloucester) and I have gathered fresh material of each of the 62 elms in Sell & Murrell (2018), and about 20 other undescribed elms, and this is being sequenced at the same commercial laboratory as was used by Whittemore and his colleagues. The preliminary results show substantial genetic differences between most of our elm samples, but indicate a high degree of previous hybridization. The likely outcome is that a fairly small number will be 'species' in the traditional sense, and most named forms will be hybrids (some involving more than two species), or distinctive variants within species. Whatever the final conclusions I believe that the full range of variation within British elms is worth documenting and recording, because they are ecologically distinct, support different insect and mite faunas (see below) and have interesting and often very restricted geographic distributions, which may shed light on past landscape history.

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Elms and insects

It has long been known that some insects prefer certain sorts of elm, and avoid others. An extreme example is European White Elm, *Ulmus laevis,* a tree which is probably introduced to Britain (though there are suggestions it might be native in certain wet woodlands). It avoids Dutch Elm Disease because its bark contains an array of chemicals, mostly terpenes, which deter bark-beetles from feeding on it (and thus introducing fungal spores). Incidentally, some of these chemicals show promise in the control of inflammation and cancer development in humans (Paschke *et al.,* 2009).

The invertebrates which are most intimately associated with their host tree are probably the leaf-miners (mostly micro-moths) and the galls (many aphid species, plus some mites): these spend the whole of their feeding life within the tissues of an elm leaf. Some galls which appear to be generally very rare, turn out to be common on particular elm species: the large, furry pouch-gall caused be the aphid *Kaltenbachiella pallida,* is rare, except that I have found it on every population of Pale-leaved Elm *U. asymmetrica* that I have examined (but rarely on other elm species nearby).

One small study (Gee *et al.,* 2023) looked at leaf-mines and galls on three elm species in three woods in Cambridgeshire. This found that elm species was a better predictor of the insects and galls present than was the locality.

There is considerable scope for further work, but it is becoming clear that insects and mites which live on elms are able to recognise the difference between at least some of the microspecies. Entomologists are aware that several elm-feeding insects are very restricted in geographic range in Britain, and some, most notably White-spotted Pinion Moth *Cosmia diffinis*, are largely confined to central England. If we do not record the finer-scale variation within elms, which Sell & Murrell's classification does admirably, we will never know if one or a few restricted elm types are responsible for the rarity of the insects.

Origins of central and eastern English elms

Based on the abundance of elm pollen in peat and lake sediments, elms have been part of the English landscape throughout the present interglacial period, and in previous warm periods between the Ice Ages, before people had a major influence on the landscape, so at least some of them are native. Unfortunately, it is not possible to identify elm pollen, wood or other macrofossil remains to species level (even using the broader species definitions), so interpretation of past distributions, means of colonisation or native/introduced status are necessarily speculative. We do not know for certain whether one sort of elm colonised quickly after the last Ice Age and the others waited for people to introduce them, or if many arrived naturally.

Richens did not think most elms reached Britain naturally, but he postulated repeated waves of introduction from the late Neolithic, the Bronze Age, Iron Age and Roman period, each wave of colonising people bringing their favourite elms with them. This is the basis of assertions in many Floras that all the smooth-leaved elms, and perhaps even English Elm', are introduced, not native. While in the absence of post-glacial subfossil evidence this cannot easily be disproven, I think there is an argument that natural colonisation, in the same way that the rest of our flora and fauna arrived, could have achieved identical results and might be more likely.

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Elms have undoubtedly been planted by people, and perhaps moved around, for several thousand years, and some of this movement may have been selective, picking a form which was particularly useful for a specific purpose. Many elms currently only rarely reproduce by seed in Britain, but grow readily from suckers and cuttings. For these reasons, some elm specialists prefer to regard most of these 'species' as cultivars.

However, I imagine most planting, at least till the modern era, was local and opportunistic - taking an elm which already grew in an area and propagating it - rather than long distance. Richens's hypothesis that each wave of colonising peoples brought their favourite elms to Britain seems to me an unnecessary complication: natural colonisation of all other groups of our native flora and fauna has created similar patterns of geographic distribution within Britain, without speculating that Neolithic, Bronze Age, Iron Age and Roman settlers all brought their favoured umbellifers, sedges, woodlice or ground-beetles with them.

If you accept the natural colonisation hypothesis, the unusually high diversity of elms in central England and in the south-west may reflect several different colonisation routes at the end of the last Ice Age:

- some elms may have reached us via the west coast of Europe (which could explain six kinds of elm largely confined to Cornwall and the south-west);
- others might have reached the south coast of England (before the Channel appeared) - *U. sativa* is confined to Hampshire and Dorset;
- some could have colonised along the valley of the River Rhine and its then tributary, the Thames (ten different elms are confined largely to Essex);
- some might have reached us across Doggerland, now under the North Sea (nine species are described from Suffolk, and largely confined to East Anglia).

These routes of colonisation have been used to explain distributions of many other groups of plants and animals, and are widely accepted in biogeographic literature. At least the latter three four routes converge on central England. If many of the original species reached this area, we know they are quite inter-fertile (like willows, for instance), so we might expect repeated hybridization to have added to the diversity.

One factor which makes me think central and eastern English elms deserve close attention is that many of them (and 50 of the 62 species in Sell & Murrell) are listed as British endemics. To an extent this may be because our elms have been studied in more detail than elsewhere. But Richens, who was based in Cambridge for much of his career and studied eastern English elms for decades, spent most of his summer holidays in France, where he studied elms - and he did not find most of the local forms over there. So, the striking observation that a single wood in Cambridgeshire may have more than four times as many different elms as France (Buff Wood has 29 different elms, France perhaps 8 or 9) could actually be true.

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Identifying elms

I have spent much of my spare time since April 2018 looking at elms in the field and indoors at pressed specimens, including a couple of days in the Cambridge herbarium. I started this because my home patch seemed unusually rich in elm variation, and because, as an entomologist, I had noticed that different insects and mites, especially the gall formers, appeared to choose certain elms and ignore others. If our rarer elm-feeding insects, such as White-letter Hairstreak butterfly and White-spotted Pinion moth are to be conserved, we need to know which elms they are using.

The more I've looked, the more unusable the keys which include only a handful of different elms appear to be. There is such enormous variation within the smooth-leaved elms, and a lot of overlap between 'smooth-leaved' and 'rough-leaved' depending on time of year and growing conditions, that I think it may be impossible to construct a short key which makes sense of them without including a much larger number of end-points.

Early on, the thought crossed my mind that dividing elms into a much larger number of units might actually be easier than trying to separate a small number. If that seems unlikely, imagine trying to put all breeds dog breeds into 2 or 3 groups, and describe the differences between them; then try to describe Dalmatian, corgi, dachshund, greyhound… the narrower categories are much clearer and easier to distinguish. I'm not saying that elms are all different 'breeds' or cultivars of one species (though that was R H Richens's final conclusion): my current sense is that most of the 62 named species in Sell & Murrell are recognisable with a little practice and are worth recording. Once we know more about their ecology and distribution (and their value to insects and mites) we will be better able to decide which are 'valid'.

So, my first aim is to produce workable keys to the 62 taxa in Sell & Murrell. This guide is a step towards that aim. As soon as that workable key exists I hope it will be possible to incorporate other elm taxa that may be encountered in Britain and Ireland, most especially the various hybrids of non-native elms which have been planted because of their supposed greater resistance to Dutch elm disease.

How different are the different elms?

Many of the described 'species' are distinctive in growth form: some are tall, slender trees almost as fastigiate as a Lombardy poplar. Some are broader than they are tall. Some are smooth barked, some rough, a few with burs like a native Black Poplar. Some sucker very freely, some not at all. Their leaf shape varies from almost circular to three times as long as wide, from broad-bottomed to broad shouldered, from glossy and smooth to rough and sandpapery, short- or long-stalked, massively asymmetrical or not. Their seeds vary from circular to quite narrow oval, and from 7-36mm long. Their associated insect and mite species are also quite choosy (these were part of the evidence Richens used to support his theory of multiple waves of human introduction from different parts of Europe). My impression is that there are also ecological differences, with a few elms associated with willow and alder carr, several more with floodplains, some with coastal areas and some are confined to ancient woodland. As noted above, many also have small and tightly-defined geographic distributions. Although their reproductive systems are different (sexual production of seed at times, vegetative reproduction otherwise), they seem to be at least as well defined and different as the microspecies of whitebeams (*Sorbus*), brambles (*Rubus*) or dandelions (*Taraxacum*), although these other groups

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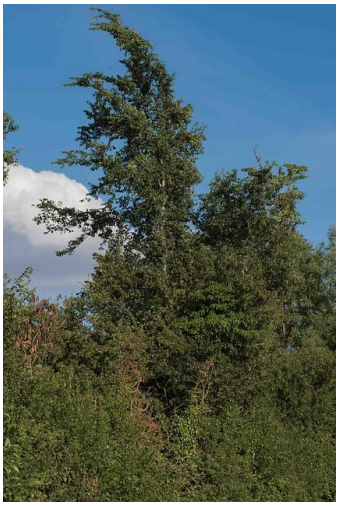
usually reproduce by seed set apomictically (without benefit of fertilisation, so cloning the female parent).



Above: Plot Elm, *Ulmus plotii* at Laxton, Northants

Above: Laxton Elm, *Ulmus crassa,* at Laxton, Northants

Below: a range of elm leaf shapes (L-R: *U. cuneiformis, U. serrata, U. serratula, U. vegeta)*

Survival after Dutch Elm Disease

One feature of elms may have resulted in most botanists giving up on them. Since the spread of a virulent strain of Dutch Elm Disease in the 1970s-80s, most of the tallest, finest trees have died, and the common perception is that only short scruffy suckers remain. Stace (2010) is typical of the despondency: 'Over large areas the elm population exists solely or largely as hedgerow suckers, and is now largely unidentifiable' (the last 'largely' was added in the third edition!). Sell & Murrell are more positive: 'Sucker leaves cannot usually be named. However, most suckers grow to 10 or more metres before they are infected again and by this time nameable mature leaves, flowers and fruits can be found… It is not true that hedgerow elms cannot be named: some are so characteristic that it is easy once one is familiar with them.'

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Oddly, the most difficult elms to sample for identification are probably woodland trees: as we are looking for 'short shoots growing in full sun', in high forest these may be beyond the reach of the longest extendible loppers.

My experience is largely positive. I've re-found identifiable living trees at 41 of the 46 type localities I've visited. I've seen hundreds of fine elm trees in the last three years, and found many country roads, lanes and footpaths in central and eastern England where elms make up the bulk of the trees, and often include a high diversity of elms. Whatever their true status, I think they deserve naming and recording. For the moment, Sell & Murrell's *Flora* provides a convenient single set of names in print and in one place. And by giving species names to all the things previously considered to be hybrids, Sell & Murrell claim that intermediates no longer exist!

Illustrations

Sell & Murrell's *Flora* includes line drawings of two leaves of each species, a terminal and a side leaf from a short shoot. These are helpful, but do not convey the range of variation in each species.

Most previous books put elms under a handful of names, so their illustrations could each represent several or many species. An online search for most of the new species names will produce little or nothing, and the more familiar names such as *Ulmus minor* or *Ulmus diversifolia* are used in very different senses by different authors and photographers, so cannot be relied upon to show what Sell & Murrell's species look like. Many 'Wych Elm, *Ulmus glabra'* photographs online are actually *U. scabra* in the sense of Sell & Murrell; and much of the supposed English Elm *U. procera* is actually Atinian Elm, *U. proceriformis,* believed to have been introduced by the Romans.

Given the lack of useable illustrations, I have spent my spare time photographing as many elms as possible. Albums of photographs of many elm species are available online at:
https://www.flickr.com/photos/cladoniophile/collections/72157668491324707/

I am expanding this collection gradually, and where possible, I've included the original tree from which the type specimen came. This is noted in the introduction to each species' album on Flickr.

Specimens for comparison

It's unfortunate but entirely understandable that the most valuable public herbaria (collections of preserved plant specimens) need to maintain the biosecurity of their specimens, so do not allow fresh material to be taken inside. I tried to get around this by photographing a representative selection of Cambridge Herbarium elm specimens (all determined by Peter Sell or Jayne Armstrong), and have since also collected around 2500 samples covering 61 of the 62 species (still awaiting samples of Guernsey Elm *Ulmus insularum,* which is apparently confined to the Channel Islands). I have re-found 41 of them at their original type locality (so, samples of those species should be correctly identified). For 12 of the others I've been able to track down a tree that Sell or Armstrong collected from, again giving some confidence in the identification. The keys are based on the descriptions in Sell & Murrell (2018) and on the samples I've looked at. For some species, this may be form a single locality or even a single tree - so, as more people look at more elms, I expect the range of variability to increase, and the keys to need modification.

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What to sample

Almost all works on elm identification refer to ***mature leaves on short shoots in full sun collected from July to September***. Short shoots**,** the side shoots on second-year twigs - usually have 3-6 leaves, are mostly slow-growing and relatively small-leaved, and the shoot stops elongating as soon as the leaves have expanded. These differ from ***leaves on suckers, epicormic shoots (leafy shoots coming directly from the main trunk), Lammas growth, or regrowth after coppicing or damage***, all of which tend to be larger, softer, hairier, sometimes rougher, and may differ in key measurements such as petiole length, leaf-base asymmetry, and leaf shape.

Generally, smooth-leaved species have rough or hairy leaves when growing in shade, and all species have much larger leaves on suckers and epicormics shoots. For these reasons, 'short shoots in full sun' becomes a mantra for anyone studying elms, and we tend to have a set of extendible loppers in the car over the summer.

When? Most guides suggest elm leaves are ready to identify from July onward. Much earlier, and 'smooth-leaved' elms may still have hairy leaves, and some species seem to change leaf shape or the relative length of the petiole or the asymmetry as they grow. In a warm year with an early Spring, many trees may be identifiable in June, but in 2021, following a very cold spring, the leaves on some trees were still rather immature at the end of June: mid July would be safer in such a year.

How late? From July to September, almost all elms will have leaves in good condition, fully mature and showing all the requisite features. With care, you may sample trees into October or even November, but leaves are likely to have suffered more insect damage. Beware when leaves start to fall: those remaining on trees may be untypical. I've noticed that *U. glabra s.s.* tends to lose the longest, narrowest leaves first, so that in early autumn, the yellowing leaves left on the tree may be shorter, broader and more rounded, and will mis-key to *U. scabra.*

Not suckers? The exclusion of 'suckers' does not mean that elms which are regrowing from the base cannot be identified after the main trunks have gone, for instance killed by Dutch Elm Disease. In many cases, the regrowth will reach 10-15m before it may succumb to the disease. The important question is whether the growth is excessively vigorous, and is producing atypical leaves (larger, hairier and probably rougher and toothier than on an ideal short shoot).

I don't think there's a hard-and-fast height rule for which suckers are identifiable and which are not. Very vigorous suckers, for instance from a felled fairly healthy tree, may reach 3-4m but still have huge leaves and soft, sappy branches. Slow regrowth from an old hedge, or a young tree growing up from the roots of its neighbour, may have normal mature foliage at 2-3m tall. As with other groups such as willows, the choice of 'short shoots' is to find those parts of the tree where the shoot does not elongate during the summer, and the leaves are not larger than typical. Short shoots will almost always have 3-6 leaves on them, and the upper two leaves will usually be the largest, and the best to try measuring and keying.

At least one previous elm specialist, K.G. Messenger of Rutland (1920-1993), sampled and identified suckers, believing that these had their own distinctive features. This may be true, and there are differences between suckers in terms of leaf size, petiole length and asymmetry (though very different from those for short shoots). I tend to collect and photograph suckers along with short shoots in case I need to compare sucker specimens. Current keys and most descriptions are based only on short shoots, so will not work for suckers.

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Ulmus cantabrigiensis, Woodland Elm, Buff Wood, Cambridgeshire

Left: short shoots, Right: sucker with larger, longer, rougher leaves

South-facing? Not necessarily: The specification of short shoots **in full sun** is to avoid deeply shaded foliage, which will be larger, softer and hairier. It does not necessarily mean that only the south side of a tree can be sampled. As long as the leaves are in the sun for part of the day, they should be fine, and light shade does not always preclude useable samples. The aim is to avoid deeply shaded foliage (either the lower branches of trees which are shaded by their own higher branches, or whole elms in the shade of other trees). The problem is that shaded leaves tend to be larger, softer, often hairier, and may differ in petiole length, asymmetry and overall shape, i.e. most features used in the keys. Leaves in full sun on the south side may mature earlier and lose any hairs and roughness (if they are a smooth-leaved species), so they might be tentatively named in May or early June, whereas those shaded for much of the day may still be a bit rough at the end of June.

If it's smooth, it's ok? Given that the difficulties causing misidentification of suckers, epicormic and shaded leaves arise because they are softer, hairier and rougher than would be found on short shoots in full sun, *if* a sample has smooth, tough and leathery leaves, they should probably key out successfully (though this hypothesis needs more testing).

No short shoots? A few species, notably *U. plotii, U. elegantissima* and *U. pseudelegantissma,* have 'short' shoots which carry on growing throughout the summer. Thankfully, these are quite distinctive species with smooth leaves with rounded, crenate teeth, so will usually be recognisible (and *U. plotii* has a very distinctive growth form, tall, slender and floppy-topped).

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Forest trees? It can be very difficult to gather suitable material from woodland elms growing within a closed canopy, as the only short shoots in sun may be in the canopy. Rackham used to sample fallen leaves in the autumn, but it is not always easy to recognise which leaves came from 'short shoots in full sun'. If you are sure that you are dealing with a single taxon, and it's smooth-leaved, then fallen smooth leaves should in theory be nameable.

No Lammas growth? Many elms, and some other trees such as oaks, produce Lammas leaves in high summer. These are a new flush of growth, often occurring if the spring foliage is badly damaged by caterpillars or other insects. The timing may vary from year to year, and tree to tree. They can appear as early as June, and trees may still be growing fresh Lammas leaves in October. They should not be used for identification: they are usually rougher, hairier, smaller and more elongate than spring foliage.

Ulmus sylvatica, Hatley Elm, Buff Wood, Cambridgeshire
Showing fresh 'Lammas growth' (the paler leaves, at the tips of the branch) unsuitable for identification

Which leaves on a short shoot? How many shoots? Within a short shoot, the terminal leaf is usually longest or second-longest, the next one or two leaves down the shoot are also large, and the lower two-three leaves are much smaller and sometimes differ in shape. The ideal leaves to measure are the terminal leaf and the second leaf down a short shoot, so a sample should comprise at least 5 short shoots.

With a little experience, it becomes fairly easy to work out which are 'suitable' leaves to key out, and you will recognise an elm as being 'smooth-leaved' even if the first leaves you examine are rough and hairy.

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Naming of parts

In due course I hope to produce an illustrated alphabetical *Glossary* of technical terms used in the key, or which you might encounter in other books.

Here, I summarise the key features used in identifying elms.

Tree shape and size: sadly, no longer very useful, as the vast majority of elms you will see will be no more than 15m tall and have not developed their mature form. When you see a full-grown elm, 30-40m tall, several features can help identify it - overall shape, whether the crown is flat, domed or conical, whether the branches are thick or slender, whether they curve downward or zigzag, and whether the main trunk continues high up into the crown or if the tree branches low down into several or many equally large subtrunks.

Bark and trunk features: again, not useful unless you have a mature tree which has developed its characteristic features. Some have fairly smooth bark, some are deeply corrugated into vertical ridges and channels, some have bark breaking down into diamond-shaped plates. A few species have numerous large burs or bosses, often with epicormic twigs growing from them.

Twig features: in theory, it might be possible to attempt to identify elms in winter. They certainly vary in the thickness, straightness/zigzag form of their twigs, and in the size, shape and colour of their buds. Sell & Murrell (2018) include descriptions of these features but do not highlight which are really distinctive or useful in identification.

Leaf features: the main features for identifying most elms. As long as you look at the leaves on *fully developed leaves on short shoots in full sun,* there are many features to look at: leaf size, length (from base of blade to tip), breadth at widest point, ratio of length: breadth, the asymmetry at the base, which can be measured along the petiole or midrib ('petiole asymmetry') or from the top of the short side to the bottom of the lobe of leaf blade on the long side ('lamina asymmetry'). **Unless otherwise stated, asymmetry is that of the blade, including the lobe.** See illustration below.

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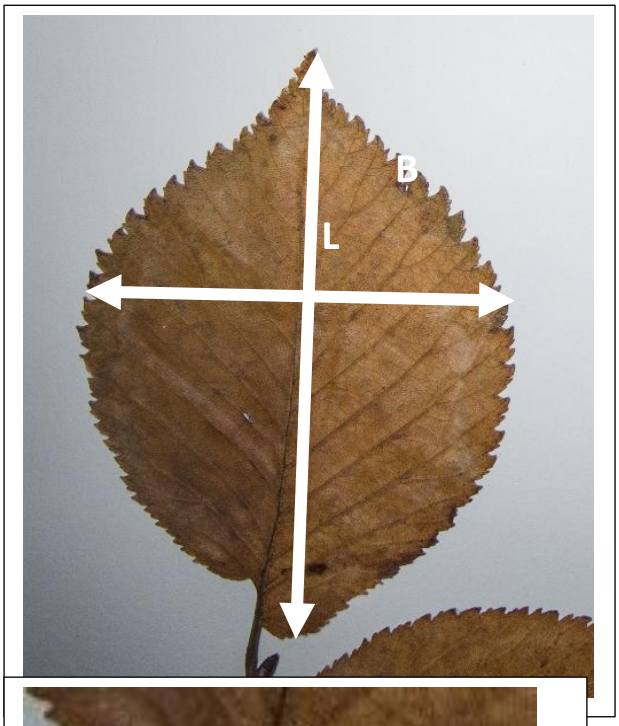
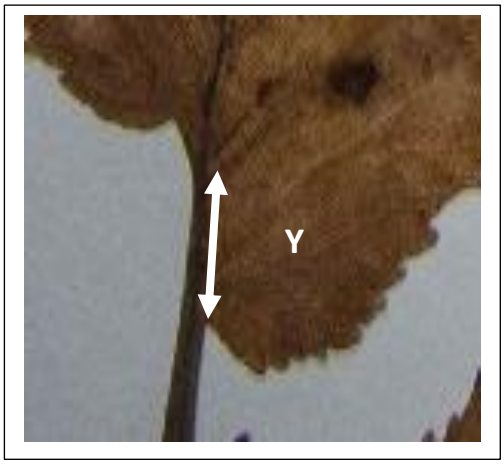
L = leaf length, B = leaf breadth, L/B = ratio of length to breadth

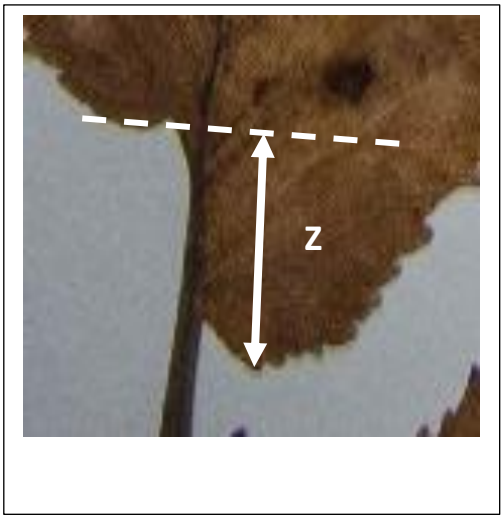


X = petiole (stalk) length

Y = petiole or midrib asymmetry

Z = lamina or blade asymmetry





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Common, rare, easy and difficult elms

About 10 elms are common and widespread in southern England. Those on the left are recorded from 10 or more vice-counties; those marked * are know from more than 10, but are generally rare or difficult to find, Many are confined mainly to one or two counties. Those marked @ are mainly East Anglian/Midland. About half the species are distinctive, and soon recognisable without a key. The other half are trickier to identify. There are a few pairs of species which are difficult to separate from each other, but are fairly distinctive compared with the rest.

Distinctive species

Common and/or widespread	**Restricted**
38. U. asymmetrica /37. U. sowerbyi @	*1 U. cornubiensis/2 U. stricta*
	*4. U. wheatleyi **
39. U. coritana	*6. U. anglosaxonica @ / 28. U. diversifolia @ /*
	7. U. angustiformis
40. U. procera/41. U. proceriformis	*11. U. plotii * / 27. U. pseudelegantissima @ /*
	31. U. elegantissima
50. U. mossii	*12. U. serrata @*
	13. U. prominentidens @ /16. U. longidentata @ /
53. U. vegeta/59. U. hollandica	*26. U. multidentata @*
	15. U. acutissima @
60. U. scabra	*17. U. sylvatica @*
	19. U. obesidens @
61. U. glabra	*22. U. laevis*
	23. U. cuneiformis @
	25. U. rhombifolia
	29. U. longicaudata @
	30. U. chaterorum
	36. U. acuminatissima @
	42. U. atrovirens @
	46. U. obesifolia
	48. U. cantabrigiensis @
	49. U. prionophylla @
	*52. U. daveyi **
	54. U. platyphylla @
	55. U. exoniensis
	59. U. insularum
	62. U. camperdownii

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Tricky species

14. U. pseudocoritana *56. U. gyrophylla @*	*3. U. sativa* *5. U. curvifolia @ / 21. U. coriaceifolia @* *8. U. rasilis @* *9. U. microdon @* *10. U. minor @ / 18. U. serratifrons @ /34. U. oblanceolata @* *20. U. longidens @* *24. U. peninsularis @* *32. U. incisa @* *33. U. alta @* *35. U. serratula @* *43. U. crenata @* *44. U. madingleyensis @* *45. U. pseudobovata @* *47. U. crassa* *51. U. occidentalis / 57. U. scabrosa*

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First and foremost, Peter Sell's work on elms over 70 years, and Jayne Armstrong's fieldwork, analysis and PhD thesis, provide the classification and nomenclature for this guide. They both left a huge wealth of carefully-labelled specimens in the Cambridge University herbarium: my thanks to the University and to Dr Lauren Gardiner, the Curator of the Herbarium, for access and guidance.

Arthur Chater was very supportive of this project, and I was delighted to meet to discuss elms when I was in Wales in 2020, in a gap between lockdowns. Arthur very kindly gave me his files of correspondence with Peter Sell on *Ulmus* when working on the proofs of Sell & Murrell's *Flora,* and also around 500 beautifully pressed and labelled elm specimens, mostly from Cardiganshire, and nearly all verified by Peter Sell. These have changed my impression of several species, and highlighted my mistakes in relocating Sell or Armstrong specimens. The elms chapter of Arthur's *Flora of Cardiganshire* is a model for anyone applying this classification to an area flora.

Lewis Saunders has provided stimulating and convivial company on fieldwork over the last five years, and his remarkable memory for the location of elms in Fenland provided many days of very productive fieldwork.

It has been a pleasure to work with Dr Cicely Marshall, formerly of King's College, Cambridge and now of the University of Gloucester, and Dr Alex Prendergast of Natural England, on the diversity ad genetics of British elms. I hope that the results of this collaboration will soon enable us to recognize the true status of each of the Sell and Murrell elms, as full species, subspecies, variety or hybrid.

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The keys

As explained at the start, this guide is prompted by the publication of Sell & Murrell (2018) which includes 62 elm species. I think most of those are worth recording, but to provide balance, I'm including shorter keys to far fewer species, which are what most other publications rely on.

Simplest keys (that don't work)

If you subscribe to the two-species view of elms, the key from Clapham, Tutin & Moore (1987) is for you:

> Leaves of short shoots 7-16cm long, usually rough above; petiole usually less than 3mm long. ***Ulmus glabra*** **Wych Elm**
>
> Leaves of short shoots usually less than 7cm long rough or smooth above; petiole more than 3mm long. ***Ulmus minor*** **Elm**

Unfortunately, over most of Britain south of central Scotland, 'Wych Elm' is the species called *Ulmus scabra* by Sell & Murrell with petioles mostly 3-7mm long. And a dozen of Sell & Murrell's smooth-leaved elms have leaves of 8-10cm long or larger.

If you prefer a three-species version, which is the approach taken by Dr Max Coleman, the BSBI's elm referee, this might suit:

1. Leaves of short shoots longer than 7cm, often more than 15cm long; roughly hairy on upper surface, 16-27 pairs of main veins, leaf stalk less than 7mm. ***U. glabra s.l.*** **Wych Elm**

   Leaves often less than 7cm long, often fewer than 16 pairs of veins, leaf stalk often more than 7mm; upper surface smooth or rough. **2**

2. Leaves usually smooth an upper side, very variable in size and shape, usually distinctly longer than wider (L:W usually 1.4-2.5 times as long as wide); leaf stalk and shoots usually hairless at maturity. ***U. minor s.l.*** **Smooth-leaved Elm**
   Leaves rough on upper side, almost circular in shape (1.1-1.6x as long as wide); leaf stalks and shoots usually hairy at maturity. ***U. procera s.l.*** **English Elm**

This is adapted from an illustrated single-sheet guide from the Natural History Museum which is available online. I've added the 'often' and 'usually' as I think about half of the elms in central England do not follow these generalisations. Compared with the 62-species approach, *U. glabra s.l.* in this key includes the seven species in my Group 1a, *U. procera* includes *U. proceriformis* and some *U. crenata* and *U. obesifolia* (my Group 1c), and *U. minor s.l.* probably includes almost everything else, though several common types of elm, such as *U. vegeta, U. hollandica* and *U. cuneiformis* would not key out.

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Before you start with the main keys…

Quite a lot of the key relies on leaf measurements, and length:breadth ratio is very useful too. Although it's sometimes possible to judge by eye, I quite often get it wrong, so I strongly recommend using a ruler or callipers to measure them. It's worth spending a couple of minutes measuring some leaves before you start. I find that 10 leaves, ideally the top two leaves of five short shoots (terminal and first lateral leaves) give a good impression of a sample, and I use a spreadsheet with the following measurements:

Feature	**Leaf 1**	**Leaf 2**	**Leaf 3**		**Means**
Leaf length	77	63	77		74.0
Leaf breadth	48	33	42		41.2
Length/breadth	1.60	1.91	1.83		1.8
Petiole asymmetry	7	4	6	…… etc!	5.6
Lamina asymmetry	12	10	11		10.8
Petiole length	14	13	14		12.6

Completing a table like this before you start trying to key a sample avoids guessing if leaves are more than twice as long as wide, whether any are asymmetrical by more than 6mm etc., which often results in having to go back and start again. Of course, you can start with the keys, and measure whatever the key asks for. If it says, *Some leaves longer than X,* you can search for the longest leaf you can find, and if it says *Some leaves more than 1.9 times as long as wide,* look for the narrowest. But don't search for too long, as there are always a few atypical, mis-shapen, under-sized or over-sized leaves, and small leaves tend to be unusually narrow).

So far, the keys all use **lamina asymmetry** but I still record petiole asymmetry, as the two together may provide a simple indication of the shape of the leaf base, and be useful additions to future keys.

The basis of the keys

My first key was a modest adaptation to that published in Sell & Murrell (2018), and I include that key later (after the *Notes on tricky species*, and before the *Descriptions and illustrations*). Many of the couplets in that key are difficult or impossible to interpret, or apply to only a proportion of samples of a species. The new keys are based on the descriptions and measurements in Sell & Murrell (2018), expanded from Cambridge samples and my own herbarium. For some species, this may be from a single locality or even a single tree - so, as more people look at more elms, I expect the range of variability to increase, and the keys to need modification.

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Main keys to all native elms

New keys

These two keys, first written in winter 2020-21, **Key 1** to rough-leaved and **Key 2** to smooth-leaved species (with a few species appearing in both) are works in progress. Many couplets rely on measurements. The measurement ranges were initially based on Sell & Murrell's measurements, the ranges increasing as I've measured more material myself. For the commoner species I have tested them on 20-30 samples, but for rarer species they are still based on elms from just one or two localities. Wider sampling will produce wider ranges of measurements for many species. For that reason, especially in the smooth-leaved species, I have allowed for variability and some variable species key in 2-3 different places. This has allowed me to be more definite in writing the couplets, as a specimen which keys the 'wrong' way may still be caught later.

All reference to leaves means ***mature leaves on short shoots in full sun***. Short shoots**,** the side shoots on second-year twigs - usually have 3-6 leaves, are mostly slow-growing and relatively small-leaved, and the shoot stops elongating as soon as the leaves have expanded: the ideal leaves to measure are the terminal leaf and the second leaf down a short shoot, so a sample should comprise at least 5 short shoots. ***Leaves on suckers, epicormic shoots (leafy shoots coming directly from the main trunk), regrowth after coppicing or damage, and Lammas growth produced later in the summer (often paler than mature leaves and very often rougher and more elongate) will probably not key out.*** Generally, smooth-leaved species have rough or hairy leaves when growing in shade, and all species have much larger leaves on suckers and epicormics shoots. A few species, notably *U. plotii, U. elegantissima* and *U. pseudelegantissma,* have short shoots which carry on growing throughout the summer. It can be impossible to gather suitable material in dense woodland, as the only short shoots in sun may be in the canopy.

The first part of each couplet gives the key features. Where a species keys out, a short description is given in brackets: leaf size, length-breadth ratio, number of veins, length of base asymmetry, and petiole length, to help confirm identification. These represent the *typical range:* you will find samples outside the range. Even the original type trees include leaves which are beyond the measurements given in the *Flora*. The descriptions are not necessarily useful in distinguishing the species at the couplet where they appear in the key, but they do provide a back-check on the identification.

Status and distribution information comes mainly from Sell & Murrell, with my own observations added, but is likely to be very incomplete, and some species may be much more widespread than records suggest. Native status for many species is contested by other authors. Endemic in this sense means that there are no confirmed records from mainland Europe or elsewhere beyond Britain and Ireland. Species numbers follow Sell & Murrell; usefully, the species are arranged in approximate order of increasing leaf size.

An expanded version of Sell & Murrell's key

I had previously (2018-19) produced a key whose structure was based on the key and descriptions in Sell & Murrell's *Flora of Great Britain and Ireland*, published in March 2018. Although I hope the new keys will be easier to use, I have included this key at the end of the identification section, for the benefit of users who do not yet have a copy of Sell & Murrell, in case an alternative route to identifications is useful.

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Key 1: a new key to rough-leaved elms

v. 2.6 **July 2025**

'Rough-leaved' elms are usually a distinct category, sometimes conspicuously and unmistakeably rough on the upper surface, but some become less rough as the summer advances, and some 'smooth-leaved' elms are rather hairy and a little rough, particularly if growing in the shade. Unlike in Sell & Murrell's key, several species key out here and also as smooth-leaved.

Species numbers are taken from Sell & Murrell, who arranged elms approximately **in order of increasing leaf size**. The ten largest-leaved species are 'rough' and the forty smallest-leaved elms are 'smooth', but beware that this applies to **mature leaves on short shoots in full sun**, as do other features in this key. All the asymmetry measurements are **lamina asymmetry,** including the downward extending lobe, if present.

0 Upper surface of leaves rough and usually matt, with some or many bristly hairs, even late in the season and high on the tree. **Key 1**

0a Upper surface of leaves smooth and often glossy, with no bristly hairs, but may have a few simple hairs and/or numerous minute glandular hairs on midrib. **Key 2**

Note: *this feature is very useful and often works well, but some 'smooth' species start off rather rough, and many 'smooth' species have rough leaves in the shade or on suckers etc. A few 'rough' species seem occasionally to become smooth late in the summer. Species which are very variable for this feature are keyed both ways.*

Check: if *any* leaves, especially those in full sun high in the tree, are smooth on the upper surface, go to Main Key, couplet 20

1 No leaves on short shoots as long as 12cm **2**

1a Some leaves on short shoots 12cm or longer **13**

2 Leaves round to shortly-oval, 1.1-1.4 times as long as broad. **3**

2a Leaves shortly-oval to elongate, 1.5-2 times as long as broad. (Doubtful species key both ways). **7**

3 Leaves round, blunt to acute at apex, 1.1-1.6 times as long as wide, never more than 9cm long and often smaller. Teeth varying form acute to obtuse or cuspidate, not prominent nor clearly curved forward. Without prominent 'shoulder' teeth. Leaves usually pocked with small mite galls. **4**

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3a Leaves round to oval, blunt, acute or acuminate at apex, 1.2-1.9 times as long as wide. Teeth usually acute and may curve toward leaf apex. May have prominent 'shoulder' teeth. Some leaves often more than 8cm long. Seldom with small mite galls. **5**

4 Leaves with 10-13 veins on the longer side. Base of leaf asymmetrical by 1-4mm. (Leaves 5-8 x 3-6cm, 1.1-1.6 times as long as wide, veins 10-13 on longer side, base asymmetrical by 1-4mm, petiole 3-7mm.) ? Introduced. Hedgerows, roadsides, field margins, and by tracks and footpaths, often in river valleys. Widespread in southern half of England and in Cards and Pembs. Apparently commoner than *U. procera* in parts of central England. Perhaps introduced by Romans for vine support.

41. ATINIAN ELM *Ulmus proceriformis*

4a Leaves with 10-16 veins on longer side. Base asymmetrical by 2-8mm. (Leaves 6-9 x 4-7cm, 1.2-1.6 times as long as wide, veins 10-16 on longer side, base asymmetrical by 3-7mm, petiole 5-8mm.) Native. Formerly on roadsides, hedgerows, parks, field margins heaths, coppices and amenity areas. Still abundant in much of S and Central Britain, persisting as self-coppicing hedgerow shrubs.

40. ENGLISH ELM *Ulmus procera*

See also Note 8 at the end of the keys on this tricky species pair and 56 Corky-barked Elm *U. gyrophylla*

5 Leaves bluntly to acutely and jaggedly serrate, with the teeth 6-12 x 5-8 x 3-6mm. Some or all teeth in upper half often huge and curving inward, claw-like. Leaves often not unfurling fully but remaining curled or twisted. (Leaves 8-11 x 6-8cm, 1.3-1.5 times longer than broad, 17-19 veins on longer side, base asymmetrical by 7-9mm, petiole 5-10mm). Native, formerly commonly planted in parks and gardens.

55. EXETER ELM *Ulmus exoniensis*

See also Note 11 at the end of the keys

5a Leaves not jaggedly toothed, teeth usually smaller. Leaves usually flat or curved down at edges, rarely with whole leaf curled or twisted (unless distorted by aphid galls). **6**

6 Underside of leaves glabrous or very nearly so, axillary tufts barely visible without a lens. Teeth wide, blunt and rounded, aligned with outline of leaf, 3-7 x 3-6 x 1.3mm. Upper surface of leaf more or less glossy and becoming smooth by mid summer. Leaves often broadest in lower half, with a broad, rounded lobe on longer side at base. (Leaves 5-9 x 3-5cm, 1.2-1.9 times longer than broad, veins 14-21 on longer side, leaf asymmetrical by 2-9mm, petiole 4-9mm.) Roadsides and hedges, frequent in Cornwall, also found in Devon and Dorset.

46. Fat-leaved Elm *Ulmus obesifolia*

6a Underside of leaves visibly hairy, at least along main vein and in axils of side veins**.** Teeth sharply pointed, with triangular teeth jutting out, 5-7 x 5-7 x 2-4mm. Upper surface

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of leaf remaining rough and dull throughout summer. (Leaves 6-11 x 4-7cm, 1.4-1.7 times as long as wide, veins 11-20 on longer side, base asymmetry 2-8mm, petiole 3-9mm). Hedgerows by roads, tracks and fields. Common in Cornwall, just extending into Devon. Numerous records from Cardiganshire.

51. Western Elm *Ulmus occidentalis*

[If not in south-west or Wales, check small-leaved **47 *U. crassa*** and **60 *U. scabra,*** from couplet 18 onward.]

7 Petiole about equal to laminar asymmetry (doubtful cases key both ways). **8**

7a Petiole clearly longer than laminar asymmetry (doubtful cases key both ways). **11**

8 Leaves mostly obovate, widest in upper half, long-tapered in lower half and short-tapered at apex. Teeth small, 3-4 x 1-2mm. (Leaves 5-7 x 3-4cm, 1.6-1.8 times as long as wide, veins 11-20 on longer side, base asymmetrical by 2-8mm, petiole 3-9mm.) Leaves often smooth when mature. Native; endemic. Known only between Dane End and Sacombe, Herts. **45. Sacombe Elm *Ulmus pseudobovata***

(Compare small-leaved **Southern Wych Elm *U. scabra,*** couplet 22a)

8a Leaves elliptical or ovate, widest at middle or below. Teeth larger, 3-8 x 1-4mm. **9**

9 Underside of leaves glabrous or very nearly so, axillary tufts barely visible without a lens. Leaves mostly broadest toward base, mostly broadly round, some leaves 1.2-1.4 times as long as wide. Teeth wide, blunt and rounded, aligned with outline of leaf, 3-7 x 3-6 x 1.3mm. Leaves often smooth and glossy by mid summer, tending to curve down at edges. (Leaves 5-9 x 3-5cm, 1.2-1.9 times longer than broad, veins 14-21 on longer side, leaf asymmetrical by 2-9mm, petiole 4-9mm.) Roadsides and hedges, frequent in Cornwall, also found in Devon and Dorset.

46. Fat-leaved Elm *Ulmus obesifolia*

9a Underside of leaves visibly hairy, at least along main vein and in axils of side veins**.** Leaves broadest in middle, elliptical, 1.4-2 times as long as wide. Teeth more sharply pointed, with triangular teeth jutting out, 4-8 x 4-7 x 2-4mm. Leaves remaining rough through summer, usually flat. **10**

10 Leaves with larger, rather jagged and more pointed teeth in upper half, leaves rhomboidal and acuminate, often broader, 1.4-1.7 times as long as broad. Petioles generally shorter and thicker, 3-9mm. Twigs rather thick and knobbly. (Leaves 6-11 x 4-7cm, 1.4-1.7 times as long as wide, veins 11-20 on longer side, base asymmetry 2-8mm, petiole 3-9mm). Hedgerows by roads, tracks and fields. Common in Cornwall, just extending into Devon. Numerous records from Cardiganshire.

51. Western Elm *Ulmus occidentalis*

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10a Leaves with more even and rounded teeth, less jagged in upper half. Leaves rounded and cuspidate, narrower on average, 1.5-2 times as long as broad. Petioles rather longer and thinner, 5-12mm. Twigs rather slender. (Leaves 5-11 x 3-6cm, 1.5-2 times as long as wide, veins 13-20 on longer side, base asymmetrical by 2-7mm, petiole 5-12mm.) Native; endemic. Confined to Madingley Wood, Cambs.

44. MADINGLEY ELM *Ulmus madingleyensis*

11 Leaves longer, more tapered, 1.7-2 times as long as broad, broadest below middle, with rather shallow, almost crenate teeth and often with a large, rounded asymmetrical bulge. Upper surface becoming smooth by mid summer. Suckers present. (Leaves 6-9 x 3-5cm, 1.7-2 times as long as wide, veins 12-16 on longer side, base asymmetrical by 2-6mm, petiole 9-11mm.) Native; endemic. In hedgerows and by tracks around Halstead, Essex, and on fen droves in north Cambs.

42. DARK-LEAVED ELM *Ulmus atrovirens*

11a Some leaves broader, 1.5-2 times as long as broad, broadest at middle, teeth sometimes sharper. Base with smaller, less protruding bulge. Upper surface remaining rough throughout summer. Usually without or with few suckers. **12**

THREE CHOICES [Three rare elms confined to ancient woodlands in Cambridgeshire: similar in measurement but look quite different; probably most easily separated by comparing illustrations. See also Note 7 at the end of the keys]

12a Leaves rounded at sides, cuspidate at apex, usually contracting rapidly into petiole, more asymmetrical, 2-7mm. Primary teeth usually broad but shallow, with a large apical tooth, a small mid tooth, and a fairly large basal tooth, 4-8 x 4-7 x 2-4mm. Asymmetrical by 2-7mm, often with a rounded lobe on longer side. (Leaves 5-11 x 3-6cm, 1.5-2 times as long as wide, veins 13-20 on longer side, base asymmetrical by 2-7mm, petiole 5-12mm.) Native; endemic. Confined to Madingley Wood, Cambs.

44. MADINGLEY ELM *Ulmus madingleyensis*

12b Leaves very variable: large, longer narrower leaves often neatly rhomboidal, acute at apex and long-tapered at base; large, broad leaves often rounded at sides, small leaves often oblanceolate and cordate at base. Acute or slightly acuminate at apex. Teeth often rounded and simple, giving a crenate effect, or with a large rounded apical tooth and a small, low basal tooth, 4-6 x 3-6 x 1-3mm. Leaves often more or less symmetrical, with both sides gently curved to a cordate base, but sometimes asymmetrical up to 6mm. (Leaves 5-10 x 3-6cm, 1.5-2 times as long as wide, veins 11-19 on longer side, base asymmetrical by 1-3(-6)mm, petiole 6.5-10mm.) Native; endemic. Only from a few boulder-clay woods in Cambs.

43. HAYLEY ELM *Ulmus crenata*

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12c Leaves rhombic and more acuminate at apex, especially the terminal leaves on short shoots. Teeth larger and more triangular, with a large apical tooth and 1-2 smaller teeth of about equal size, 4-6 x 2-4mm. Leaves often almost symmetrical and cuneate at base, up to 4mm asymmetrical. Base of leaves almost symmetrical, or with asymmetry up to 3.5mm. Leaves often neatly diamond-shaped or oval, broadest at or close to middle. (Leaves 6-10 x 4-6cm, 1.5-2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 1-3.5mm, petiole 6-11mm.) Native; endemic. Known only from Buff, Hayley and Oaks Woods and Coton area Cambs.

48. WOODLAND ELM *Ulmus cantabrigiensis*

13 Petiole often longer than 12mm, asymmetry often more than 10mm, base on short side often sinuate, with a concave loop next to petiole caused be the bare lowest vein where lamina joins vein before midrib. Usually smooth or becoming smooth by mid summer. **14**

13a Petiole not more than 11mm, asymmetry less than 10mm or leaves often longer than 16cm and very rough. Lowest vein on short side not bare (lamina reaches midrib) so without a concave loop. **15**

14 Leaves generally broader and shorter: 7-14 x 4-8cm, 1.5-1.8 times as long as broad, tapering to an acute or slightly acuminate apex, veins 13-21 on longer side, lamina asymmetry 4-13mm, petiole 6-13mm.) Native, perhaps endemic. Roadsides, hedgerows, copses and parks. Widely distributed from Cornwall to East Anglia, north to Yorkshire and south Wales. **59. DUTCH ELM *Ulmus hollandica***

14a Leaves generally longer and narrower: 8-16 x 5-9cm, 1.5-2 times as long as wide, tapering to an acuminate apex, veins 12-22 on longer side, lamina asymmetry 6-18mm, petiole 9-16mm. Native. Said to originate in Hinchingbrook Park, Hunts, now widely planted, frequent in hedges, wood margins and modern roadside plantings.

53. HUNTINGDON ELM *Ulmus vegeta*

For this tricky species-pair, see also Note 10 at end of keys

15 Leaves broadly oval, 1.2-1.8 times as long as broad. Leaves either acuminate-cuspidate, or (one species) if with 'shoulders' then leaves huge (14-18 x 8-11cm). **16**

15a Leaves narrower, often lanceolate or oblanceolate, 1.5-3 times as long as broad. Leaves often with 'shoulders' which may have large teeth. **18**

16 Leaves mostly round or oval, tapering to an acuminate or acute apex without shoulders, tapering toward the base, 1.2-1.8 L:B, smaller, 7-13 x 4-8cm. **17**

16a Leaves oblanceolate, often with shoulders, larger, 14-18 x 8-11cm. The largest-leaved elm: leaves on short shoots 8-11cm wide, asymmetrical by 11-14mm (leaves on suckers and long shoots often much larger), often with a rather rectangular bulge

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on the long side, and sometimes short side too, so looking straight- or square-based. A flat-topped or round-topped tree, most often with arching branches and drooping twigs, giving an umbrella-shaped or weeping appearance, though occasionally not weeping. (Leaves 14-18 x 8-11cm, 1.6-1.8 times as long as broad, veins 18-25 on longer side, base asymmetrical by 11-14mm, petiole 8mm.) Planted in parks, gardens and churchyards, occasionally in the countryside usually a small weeping tree, but sometimes like *U. scabra* but with larger leaves and fruits.

62. CAMPERDOWN ELM *Ulmus camperdownii*

17 Leaves broader, usually 1.2-1.6 times as long as broad, cuspidate to short-acuminate. Shorter side often sinuate at base, with a concave part nearest petiole caused by a bare 1-4mm of the lowest vein (like 53 *vegeta* and 59 *hollandica)*. Teeth larger, 6-11 x 3-5mm, curving strongly toward apex. (Leaves 7-13 x 5-8cm, 1.2-1.6(-2.1) times as long as wide, veins 9-16 on longer side, base asymmetrical by 2-9mm, petiole 6-11mm.) Native; endemic. Field margins and hedgerows. Bassingbourn, East Hatley, Hayley Wood, and Bottisham, Cambs. **54. BASSINGBOURN ELM *Ulmus platyphylla***

See also Note 10 at the end of the keys

17a Leaves somewhat narrower, 1.2-1.8 times as long as broad, acute or acuminate. Shorter side usually tapering forward at base. Teeth smaller, 5-8 x 2-4mm, less curved toward apex. (Leaves 7-12 x 4-7cm, 1.2-1.8 times as long as wide, veins 15-19 on longer side, base asymmetrical by 4-8mm, petiole 5-11mm.) Native; endemic. By roads and tracks and in hedgerows and copses. Widespread in Norfolk, Suffolk and Leics, outliers in Wilts, Sussex, Essex, Monmouth, Herefs, Cards and Yorks.

56. CORKY-BARKED ELM *Ulmus gyrophylla*

See also Note 8 at the end of the keys on potential confusion with 40 English Elm *U. procera* and 41 Atinian Elm *U. proceriformis*

18 Leaves mostly more than twice as long as broad, some leaves 3 times as long as broad. **19**

18a Leaves seldom more than twice as long as broad, mostly 1.5-2 times, never approaching 3 times. **20**

See also Note 11 for species keying from this point onward

19 Leaves 10-18 x 4-9cm, 2-3 times as long as broad, veins 17-27 on longer side, base asymmetrical by 3-13mm, the longer side often overlapping the petiole, petiole 3-6mm. A tall, upright tree, main trunk extending up to three-quarters the way through the crown. Native, copses, river valleys and woods. Widespread in northern and western Britain and Ireland, especially in the hills. Very largely replaced by *U. scabra* in the south and east. **61. NORTHERN WYCH ELM *Ulmus glabra***

To separate* U. glabra *from* U. scabra, *see also Note 11 at end of keys

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19a Leaves 8-12 x 3-6cm, 2-3 times as long as wide, veins 21-24 on longer side, base asymmetrical by 3.5-7mm, petiole 6-9mm. A broad-domed thickset tree, the trunk not extending more than a quarter the way through the crown. Native; endemic. Known only in vicinity of Laxton, Northants. **47. LAXTON ELM *Ulmus crassa***

20 Leaves larger, 14-18 x 8-11cm; tree often 'weeping'. The largest-leaved elm: leaves on short shoots 8-11cm wide, asymmetrical by 11-14mm (leaves on suckers and long shoots often much larger), often with a rather rectangular bugle on the long side, and sometimes short side too. A flat-topped or round-topped tree, most often with arching branches and drooping twigs, giving an umbrella-shaped or weeping appearance, though occasionally not weeping. (Leaves 14-18 x 8-11cm, 1.6-1.8 times as long as broad, veins 18-25 on longer side, base asymmetrical by 11-14mm, petiole 8mm.) Planted in parks, gardens and churchyards, occasionally in the countryside usually a small weeping tree, but sometimes like *U. scabra* but with larger leaves and fruits. **62. Camperdown Elm *Ulmus camperdownii***

20a Leaves smaller, 7-15 x 4-9cm. Not 'weeping'. **21**

21 Leaves ovate-lanceolate, acuminate to acute, without shoulders. Largest teeth around middle of leaf, prominent, broadly triangular and jagged, 5-9 x 5-9 x 2-4mm. Petiole not covered by lobe. Leaves usually broadest in middle, without or with a narrow lobe at base. (Leaves 7-12 x 4-7cm, 1.5-2 times longer than broad, veins 10-20 on longer side, leaf asymmetrical by 4-8mm, petiole 6-8mm.) Hedgerows and copses, by tracks and roads, in woods and along beaches, frequent in southern Cornwall, scattered records elsewhere in Cornwall, one record from Devon and a few in Cardiganshire. **57. Scabrid Elm *Ulmus scabrosa***

21a Leaves often with broad shoulders and larger teeth at shoulders, so largest teeth in upper third of leaf, and often longer and narrower. Petiole often covered by overlapping basal lobe of leaf. **22**

22 Young shoots (but not petioles) with few to many long gland-tipped hairs, which start clear, and turn opaque white, orange, red or brown as they age and dry out. (Leaves 10-15 x 6-9cm, 1.5-2 times as long as broad, veins 16-26 on longer side, base asymmetrical by 2-8mm, petiole 3-7mm.) Native; endemic. Hedgerows and copses. Widespread in England from Cornwall to Derbys, Essex, Suffolk and Norfolk, Cards. **50. MOSS'S ELM *Ulmus mossii***

22a Young shoots without gland-tipped hairs. (Leaves 8-17 x 4-11cm, 1.6-2.2 times as long as wide, veins 16-26 on longer side, base asymmetrical by 2-8mm, petiole 3-7mm.) Native. In woods and copses, along sea-cliffs, in hedgerows on mountain cliffs, in plantations and parks and on roadsides. Probably throughout Britain and Ireland, far commoner than *U. glabra* in central England as far north as Yorkshire, but less common in Scotland. **60. (SOUTHERN) WYCH ELM *Ulmus scabra***

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To separate these and related species, see also Note 11 at end of keys

Key 2: a new key to smooth-leaved elms

v. 2.5 **July 2025**

'Smooth-leaved' elms are usually a distinct category, based on m**ature leaves on short shoots in full sun,** but many start the season with some hairs on the upper surface which make them feel somewhat rough. Leaves on suckers, epicormic growth and particularly vigorous shoots are often rough and hairy, as well as being larger and more prominently toothed than those on short shoots. If growing in shade, these hairs may persist throughout the summer.

Generally, **if *any* leaves, especially those in full sun high in the tree, are smooth on the upper surface, they will key out here.** Unlike in Sell & Murrell's key, several species key out here and also as smooth-leaved.

Species numbers are taken from Sell & Murrell, who arranged elms **in order of increasing leaf size**. The ten largest-leaved species are 'rough' and the forty smallest-leaved elms are 'smooth', but beware that this applies to **mature leaves on short shoots in full sun**, as do other features in this key. Leaves on suckers and other vigorous shoots will often be larger and rougher and will not key out. All the asymmetry measurements are **lamina asymmetry,** including the downward extending lobe, if present.

A few rough species, such as *U. procera*¸ are on rare occasions recorded as smooth-leaved. They are therefore included here.

0	Leaves rough and usually matt, with some or many bristly hairs on upper leaf surface, even late in the season and high on the tree.	**Key 1**
0a	Leaves smooth and often glossy, with no bristly hairs, but may have a few simple hairs and/or numerous minute glandular hairs on midrib	**(Key below)**
1	Some leaves more than twice as long as broad (doubtful species key both ways).	**2**
1a	Narrowest leaves no more than twice as long as broad.	**29**
2	Leaves narrower: broadest leaves at least 1.7 times as long as broad (doubtful species key both ways).	**3**
2a	Leaves broader, some leaves less than 1.7 times as long as broad.	**17**
3	Asymmetry at least 8mm on some leaves, and rarely less than 4mm.	**4**
3a	Asymmetry no more than 6mm.	**12**

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4 Flowers and fruits on long stalks, which often remain like tufts of blackish wires over the summer. Teeth finely pointed and strongly curved toward apex. (Leaves 4-12 x 3-6cm, 1.6-2.1 times as long as wide, veins 17-21 on longer side, base asymmetrical by 3-7(-12)mm (acc. S&M; my samples are 9-17mm), petiole up to 5(-7)mm (acc. S&M; mine are 6-11mm). Introduced, rarely planted and occasionally self-seeding, e.g. by car park at Fineshade, Northants. **22. EUROPEAN WHITE ELM *Ulmus laevis***

4a Flowers and fruits almost sessile; teeth coarser, less finely pointed and less curved. **5**

In absence of fruit, if leaves are larger, 7-16 x 4-9cm, asymmetries greater, 4-18mm, petioles longer, 6-16mm, go to couplet 75.

5 Leaves trapezioid, more or less oblong, long and parallel-sided, with an almost-square asymmetry lobe at base on long side; leaves larger, 8-11 x 3-5cm. (Leaves 2-2.5 times as long as wide, veins 16-20 on longer side, base asymmetrical by 3-9mm, petiole 7-14mm.) Native; endemic. Roadsides, by streams and in hedgerows. Scattered in Suffolk, Beds, Cambs, Hunts and Northants, outliers in Cards and Herefs.
23. WEDGE-LEAVED ELM *Ulmus cuneiformis*

5a Leaves lanceolate, obovate or ovate or rhombic; asymmetry lobe smaller; leaves smaller, 5-10 x 3-6cm. **6**

6 Some leaves very narrowly lanceolate, 2.5-2.7 times as long as broad; leaf apex long-acute or acuminate; small leaves often cordate at base. **7**

6a Leaves broader, no more than 2.3 times as long as broad, short-acute or cuspidate at apex; leaves cuneate or strongly lopsided at base. **9**

7 Most leaves widest in basal third; teeth blunt or crenate. (Leaves 6-10 x 3-6cm, 2-2.5 times as long as wide, veins 15-19 on longer side, base asymmetrical by 3-8mm, petiole 8-13mm.) Native; endemic. Between Wicken Bonhunt and Newport in north Essex, and in the Linton area of Cambs. **15. BONHUNT ELM *U. acutissima***

7a Most leaves widest around middle or sometimes above the middle; teeth jagged or neatly acute. **8**

8 Teeth small, even and regular; leaves often curved; upper surface dark green with contrasting pale underside; 'willow-like'. (Leaves 6-10 x 3-4cm, 1.7-2.7 times as long as wide, veins 13-22 on longer side, base asymmetrical by 2-9mm, petiole 7-11mm.) Native; endemic. Confined to Buff and Hayley Woods at Hatley St George in south Cambs, and a few fenland droves in the north of the county.
17. HATLEY ELM *Ulmus sylvatica*

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8a Teeth in apical half noticeably larger; leaves usually flat and straight; bright green above, only slightly paler below; not 'willow-like'. (Leaves 5-10 x 3-5cm, 1.7-2.5 times as long as wide, veins 10-21 on longer side, base asymmetrical by 2-10mm, petiole 7-14mm.) Native; endemic. Roadsides, hedgerows, copses, stream-banks, parks, meadows, fens and woods. Among the most common elms in Cambs, especially along valley of R Cam. Common also in Hunts, extending into Beds, Leics and Northants. **10. CAMBRIDGE ELM *Ulmus minor***

See also Note 3 at the end of the Keys

9 Leaves lanceolate to oblanceolate, acute-acuminate to long-acuminate at apex, with base either cuneate or with a slightly bulging asymmetry. **10**

9a Leaves ovate, acute-cuspidate at apex; most leaves with a large, rounded bulging asymmetry at the base. **11**

10 Leaves acuminate, with rather jagged acute teeth in apical half, leaves often narrow and with more veins (11-20). (Leaves 5-10 x 3-5cm, 1.7-2.3 times as long as wide, veins 11-20 on longer side, base asymmetrical by 2-8mm, petiole 6-13mm.) Native; endemic. Roadsides and field margins. Frequent in Hunts, extending into Cambs, Beds and Leics. **34. NARROW-LEAVED ELM *Ulmus oblanceolata***

See also Note 3 at the end of the Keys

10a Leaves obtuse or mildly acute, with obtuse or squared teeth, leaves rather broader, with fewer veins (13-16). (Leaves 6-9 x 4-5cm, 1.6-2.1 times as long as wide, veins 13-16 on longer side, base asymmetrical by 4-8mm, petiole 9-13mm.) Native; endemic. Known only from Navestock Heath in S Essex and Pebmarsh in N Essex. **35. PEBMARSH ELM *Ulmus serratula***

11 Leaf blades mid to dark green, not very twisted, mostly oblanceolate, broadest just above the middle. Teeth in apical third larger, more prominent and distinctly irregular. Petiole shorter and thicker (9-14mm). (According to Sell & Murrell: Leaves 6-8 x 3-4cm, 1.8-2.1 times as long as wide, yellowish-green above, paler beneath, veins 13-16 on longer side, base asymmetrical by 3-8mm, petiole 9-14mm.) Native; endemic. . Despite S&M's suggestion that it is common and widespread in eastern England and eastern Midlands, appears to be rare, found mainly in Hertfordshire with one Cambs record. **37. SOWERBY'S ELM *Ulmus sowerbyi***

11a Leaf blades pale or very pale green, often twisted in upper half, mostly broadest at about the middle. Teeth in apical third smaller, more regular. Petiole longer and thinner (10-20mm). (Leaves 5-9 x 3-6 cm, 1.5-2 times as long as wide, veins 14-17 on longer side, base asymmetrical by 5-15mm.) Native; endemic. By roads, tracks and

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fields, and in hedgerows. Scattered, Cambs, Norfolk, Suffolk, with outliers in Oxon, Northants, Lincs, Leics and Notts. **38. PALE-LEAVED ELM. *Ulmus asymmetrica***

NOTE: I am unsure that '*U. sowerbyi*' as used by Sell & Murrell is the species described by C E Moss in 1914 as *U. nitens* var. *sowerbyi.* The latter may be a separate taxon. *U. asymmetrica* and *U. sowerbyi* may be much more similar that Sell & Murrell suggest, if indeed they are distinguishable. Sell and Armstrong appear to have found few it any specimens of *sowerbyi.* See Note 6 at the end of the keys for more information. *U. insularum* might key here, too.

12 Leaves larger, 6-10 x 3-5cm, with larger teeth, 4-9 x 4-8 x 3-4mm **13**

12a Leaves smaller, 4-7 x 2-4cm, with smaller teeth, 3-6 x 1-3mm **14**

13 Leaves acuminate, proportionately broader and more jagged-toother, teeth larger, 6-9 x 4-8 x 2-4mm, veins more numerous, 13-21 on longer side (Leaves 6-9 x 3-5cm, 1.6-2.4 times as long as wide, base asymmetrical by 2-6mm, petiole 6-9mm.) Native; endemic. Scattered records, N Essex, E Suffolk, E Norfolk, Hunts.

LARGE-TOOTHED ELM 49. *Ulmus prionophylla*

See also Note 5 at the end of the Keys

13a Leaves acute, proportionately narrower and with smaller teeth, 4-5.5 x 4-5 x 3-3.5mm and fewer veins, 13-16 on longer side. (Leaves 6-10 x 3-5cm, 1.8-2.5 times as long as wide, base asymmetrical by 2-5mm, petiole up to 8mm.) Forming a small wood on the Cardiganshire coast. **30. CHATERS' ELM *Ulmus chaterorum***

14 Leaves broader, 1.7-2.2 times as long as broad. **15**

14a Leaves narrower, 2-2.7 times as long as broad. **16**

15 Leaves more asymmetrical (2-6mm), teeth in apical half larger than in basal half, leaves rather broader on average. (Leaves 5-7 x 3-4cm, 1.7-2.2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 7-10mm.) Native; endemic. A few scattered records by roads in Cambs and Hunts

21. LEATHERY-LEAVED ELM *Ulmus coriaceifolia*

15a Leaves less asymmetrical (usually 0-4mm, occasionally -7mm), teeth more even, not conspicuously larger in apical half, leaves narrower on average**.** (Leaves 5-7 x 2-4cm, (1.4-)1.9-2.2 times as long as wide, veins 12-19 on longer side, base asymmetrical by 0-4mm, petiole 5-10(-12)mm.) Native; endemic. Roadsides and hedgerows in N Herts extending into Cambs and Essex

5. CURVED-LEAVED ELM *Ulmus curvifolia*

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16 Leaves smaller, 4-7 x 2-3cm, rather narrower, 2-2.5 (-2.7) times as long as broad. Leaves narrowly elliptical, medium to pale or yellow-green above: a conspicuously long-leaved species, leaves broadest at about the middle. Conspicuous triangles of white or fawn felty hairs in axils of veins on underside. (Leaves 4-7 x 2-3cm, 2-2.5 (-2.7) times as long as wide, veins 13-18 on longer side, base asymmetrical by 1-4mm, petiole 7-9mm.) Native; endemic. A few small trees regrowing after disease in South Luffenham, Leics, and two in Cards. **7. LUFFENHAM ELM *Ulmus angustiformis***

16a Leaves rather larger, 6-10 x 3-5cm, broader, 1.8-2.5 times as long as broad. (Veins 13-16 on longer side, base asymmetrical by 2-5mm, petiole up to 8mm.) Forming a small wood on the Cardiganshire coast. **30. CHATERS' ELM *Ulmus chaterorum***

17 Longest leaves more than 9cm long (doubtful go both ways). **18**

17a Longest leaves 9cm or less (doubtful go both ways). **23**

18 Flowers and fruits on long stalks, up to 20mm long, which often remain like tufts of blackish wires over the summer. Leaf teeth finely pointed and strongly curved to apex. (Leaves 4-12 x 3-6cm, 1.6-2.1 times as long as wide, veins 17-21 on longer side, base asymmetrical by 3-7(-12)mm (acc. S&M; my samples are 9-17mm), petiole up to 5(-7)mm (acc. S&M; mine are 6-11mm). Introduced, rarely planted and occasionally self-seeding, e.g. by car park at Fineshade, Northants.
22. EUROPEAN WHITE ELM *Ulmus laevis*

18a Flowers and fruits almost sessile; teeth coarser and less curved. **19**

19 Teeth small, even and regular; leaves often curved, dark green with contrasting pale underside; 'willow-like'. (Leaves 6-10 x 3-4cm, 1.7-2.7 times as long as wide, veins 13-22 on longer side, base asymmetrical by 2-9mm, petiole 7-11mm.) Native; endemic. Confined to Buff and Hayley Woods, Cambs, a few fen droves in north Cambs, and at least one roadside hedge in north Beds. **17. HATLEY ELM Ulmus sylvatica**

19a Teeth larger, often irregular or jagged. Leaves not curved, not 'willow-like'. **20**

20 Leaf apex strongly acuminate, base strongly tapered, shorter side usually tapering into petiole and often concave in basal 20% of leaf. (Leaves 6-10 x 3-5cm, 1.5-2.3 times as long as wide, veins 13-22 on longer side, base asymmetrical by 3-7mm, petiole 5-9mm.) Native; endemic. Scattered in N Essex, S-E Cambs, W Suffolk and E Norfolk. 1 record Cards. **29. LONG-TAILED ELM *Ulmus longicaudata***

20a Leaf apex obtuse, cuspidate, acute or slightly acuminate, base less strongly tapered, shorter side rarely concave at base. **21**

If leaves are larger, 7-16 x 4-9cm, asymmetries greater, 4-18mm, petioles longer, 6-16mm, go to couplet 75.

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21 Teeth from midleaf upwards very jagged and suddenly much larger than teeth in basal half. Asymmetry 2-6mm. (Leaves 6-9 x 3-5cm, 1.6-2.4 times as long as wide, veins 13-21 on longer side, base asymmetrical by 2-6mm, petiole 6-9mm.) Native; endemic. Scattered records, N Essex, E Suffolk, E Norfolk, Hunts.

LARGE-TOOTHED ELM 49. *Ulmus prionophylla*

21a Teeth smaller, less jagged and less contrastingly large from midpoint upwards. Asymmetry 2-10mm. **22**

See also Note 5 at the end of the Keys

22 Leaves lanceolate, tapering to an acute or slightly acuminate apex. 10-21 veins. Teeth more triangular. **10 CAMBRIDGE ELM U. minor**
18 BURRED ELM U. serratifrons
34 NARROW-LEAVED ELM U. oblanceolata

See Note 3 at the end of the Keys to distinguish.

22a Leaves broadly lanceolate to oval, tapering to an obtuse, right-angled or slightly cuspidate apex. 13-16 veins. Teeth broad but shallow. (Leaves 6-9 x 4-5cm, 1.6-2.1 times as long as wide, veins 13-16 on longer side, base asymmetrical by 4-8mm, petiole 9-13mm.) Native; endemic. Known only from Navestock Heath in S Essex and Pebmarsh in N Essex. **35. PEBMARSH ELM *Ulmus serratula***

23 Never asymmetrical by more than 5mm. **24**

23a Some leaves usually asymmetrical by 6mm or more. **25**

24 Leaves broadly ovate, acute at apex, often widest above the middle - broad-shouldered. Teeth blunt. (Leaves 5-7 x 3-4cm, 1.5-2.2 times as long as broad, veins 11-16 on longer side, base asymmetrical by 0.5-3mm, petiole 5-8mm.) Common in Cornwall and Devon, extending into Somerset, Dorset, with scattered records in Sussex, Middx and Bucks. **2. SMALL-LEAVED ELM *Ulmus stricta***

24a Leaves variable but usually lanceolate with an acuminate apex, widest at middle. Teeth in upper half acute and jutting out triangularly. (Leaves 4-7 x 3-4cm, 1.3-2.1 times as long as broad, veins 11-16 on longer side, base asymmetrical by 1-5(-6)mm, petiole 4-9mm.) Native; endemic. Roadsides, hedgerows and copses. Widespread in Essex, Herts, Suffolk, Norfolk and Cambs.

28. EAST ANGLIAN ELM *Ulmus diversifolia*

See also Note 2 at the end of the Keys

25 Leaves large, up to 9cm long, long-tapered, acuminate, with teeth large and jagged in apical half, 6-9 x 4-8 x 2-4mm. Veins more numerous, 13-21. (Leaves 6-9 x 3-5cm, 1.6-

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2.4 times as long as wide, base asymmetrical by 2-6mm, petiole 6-9mm.) Native; endemic. Scattered records, N Essex, E Suffolk, E Norfolk, Hunts.

LARGE-TOOTHED ELM 49. *Ulmus prionophylla*

See also Note 5 at the end of the Keys

25a Leaves often smaller, blunt, acute or cuspidate, not long-acuminate. Teeth smaller and usually more blunt and more even, no more than 7mm long, Veins fewer, up to 17. **26**

26 Tree narrow in outline even when quite young, slender, the top characteristically flopping to one side, lower branches pendulous. Teeth often blunt, so leaves often appear crenate. 'Short' shoots continue to lengthen during summer. Longest leaves of short shoots not exceeding 6cm long. Petiole 1-6mm. (Leaves 4-6 x 2-4cm, 1.3-2.3 times as long as broad, veins 8-14 on longer side, base asymmetrical by 4-10mm, petiole 1-4mm.) Native; endemic. Roadsides, stream-banks, along fields and in hedgerows. Mainly in area between Fens, Chilterns, Marlborough Downs and Welsh mountains. **11. PLOT'S ELM. *Ulmus plotii***

(See also 27 Essex Elm, *U. pseudelegantissima* and 31 Midland Elm, *U. elegantissima*, separated in Note 4 at the end of the Keys.)

26a Tree rarely very narrow in outline, seldom with floppy top. Branches not usually pendulous. Teeth blunt to acute, not appearing crenate. Short shoots stop growing in early summer. Longest leaves of short shoots reaching at least 7 cm. Petiole 6-13mm. **27**

27 Teeth acute, leaf apex acute to cuspidate. Leaves up to 7cm long, asymmetry up to 6mm. (Leaves 5-7 x 3-4cm, 1.7-2.2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 7-10mm.) Native; endemic. A few scattered records by roads in Cambs and Hunts

21. LEATHERY-LEAVED ELM *Ulmus coriaceifolia*

27a Teeth obtuse or rounded at tips. Leaf apex right-angled or short-acute or short-cuspidate. Leaves to 8-9cm long, asymmetry up to 8mm. **28**

28 Teeth larger, the largest 5-8mm long, angular-obtuse, usually with two secondary teeth, the middle one often sticking out, sometimes longer than primary tooth. Petiole up to 13mm. (Leaves 6-9 x 4-5cm, 1.6-2.1 times as long as wide, veins 13-16 on longer side, base asymmetrical by 4-8mm, petiole 9-13mm.) Native; endemic. Known only from Navestock Heath in S Essex and Pebmarsh in N Essex.

35. PEBMARSH ELM *Ulmus serratula*

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28a Teeth smaller, the largest 5-6mm long, often rounded, either simple or each with rather small secondary tooth. Petiole up to 10mm. (Leaves 5-8 x 3-4cm, 1.5-2.3 times as long as wide, veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 6-10mm.) Native; endemic. The characteristic elm of the Dengie Peninsula in south Essex. Also recorded from Bedfordshire.

24. PENINSULA ELM *Ulmus peninsularis*

29 THREE CHOICES (doubtful cases key both ways)

29a Longest leaves on short shoots no more than 5cm. **30**

29b Longest leaves on short shoots more than 5cm but less than 9cm. **32**

29c Longest leaf on short shoots more than 9cm. **69**

30 Leaves widest in upper half, 'broad-shouldered'.

1. **CORNISH ELM *U. cornubiensis***
2. **SMALL-LEAVED ELM *U. stricta***
3. **GOODYER'S ELM *U. sativa***

Three very similar species. See Note 1 at the end of the Keys to distinguish.

30a Leaves widest in middle or in lower half. **31**

31 Tree narrow in outline even when quite young, slender, the top characteristically flopping to one side, lower branches pendulous. Leaves larger, 4-6 x 2-4cm, with greater asymmetry, 4-10mm. Teeth often blunt, so leaves often appear crenate. 'Short' shoots continue to lengthen during summer. Longest leaves of short shoots not exceeding 6cm long. Petiole 1-6mm. (Leaves 1.3-2.3 times as long as broad, veins 8-14 on longer side, base asymmetrical by 4-10mm, petiole 1-4mm.) Native; endemic. Roadsides, stream-banks, along fields and in hedgerows. Mainly in area between Fens, Chilterns, Marlborough Downs and Welsh mountains.

11. PLOT'S ELM. *Ulmus plotii*

(See also 27 Essex Elm, *U. pseudelegantissima* and 31 Midland Elm, *U. elegantissima*, separated in Note 4 at the end of the Keys.)

31a Tree rarely very narrow in outline, seldom with floppy top. Branches not usually pendulous. Leaves smaller, 3-5 x 2-3cm, with smaller asymmetry, 0-4mm. (Leaves 1.6-1.9 times as long as broad, veins 9-13 on longer side, petiole 4-8mm.) Native; endemic. Hedgerows, confined to a few localities in north Essex.

8. SMOOTH-LEAVED ELM *Ulmus rasilis*

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32 Teeth in upper half of leaf jagged: the 3-5 large teeth on either side of apex acute, triangular (equilateral or longer than broad), standing out from leaf outline. (Doubtful cases key both ways). **33**

32a Teeth in upper half of leaf less prominent, often obtuse or broader than long. **40**

33 Leaves broader, 1.3-1.9 times as long as broad, strongly diamond-shaped (widest in middle and tapering with straight sides above and below) see illustrations. (Leaves 5-9 x 3-6cm, veins 9-17 on longer side, base asymmetrical by 1-6mm, petiole 7-11mm.) Native; endemic. Hedgerows and copses. Scattered records in Essex and Herts, also found in Hunts and Northants.

25. RHOMBIC-LEAVED ELM Elm *Ulmus rhombifolia*

33a Leaves often narrower, less strikingly rhombic, more rounded at sides. **34**

34 Leaves boldly serrate, with primary teeth long and jagged, often simple or with only a single secondary tooth on each primary tooth; teeth acute but with rounded tips, often paler at tips of teeth. Prominent teeth often extending almost to base. (Leaves 4-7 x 2-4cm, 1.4-2 times as long as wide, veins 10-16 on longer side, base asymmetrical by 1-4mm, petiole 5-9mm.) Native; endemic. Confined to roadsides, copses and hedgerows in the areas of Assington Green, Suffolk.

12. ASSINGTON ELM *Ulmus serrata*

34a Teeth less strongly serrate; primary teeth often with 2-3 secondary teeth. Basal half small-toothed and not jagged. **35**

35 Leaves smaller, no more than 7cm long; asymmetry 5mm or less; petiole 9mm or less. **36**

35a Leaves larger, often 8-9cm long; asymmetry up to 8mm; petiole to 10mm. **38**

36. Leaves longer and narrower, not less than 1.7 times as long as broad, and some up to 2.2 times. Teeth smaller, no more than 2.5mm deep, less jagged, primary teeth aligned with secondary, and outer tooth edges aligned with leaf margin. (Leaves 5-7 x 3-4cm, 1.7-2.2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 7-10mm.) Native; endemic. A few scattered records by roads in Cambs and Hunts. **21. LEATHERY-LEAVED ELM *Ulmus coriaceifolia***

36a Leaves often broader, some 1.5 times as long as broad or less, rarely more than twice as long as broad. Teeth larger, those in apical third boldly triangular, up to 4mm deep. Primary teeth projecting further out than secondary, and tooth edges form an angle with leaf outline. **37**

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37 Leaves more variable in shape, narrowly obovate to narrowly elliptical, 1.3-2.1 times as long as broad. (Leaves 4-7 x 3-4cm, veins 11-16 on longer side, base asymmetrical by 1-5mm, petiole 4-9mm.) Native; endemic. Roadsides, hedgerows and copses. Widespread in Essex, Herts, Suffolk, Norfolk and Cambs.

28. EAST ANGLIAN ELM *Ulmus diversifolia*

37a Leaves more uniform shape, 1.5-2 times as long as broad. **See also Table X.** (Leaves 4-7 x 2-4cm, 1.5-2 times as long as wide, veins 11-15 on longer side, base asymmetrical by 1-4mm, petiole 4-9mm.) Native; endemic. Heaths, commons, churchyards and stream sides, by roads tracks and fields, and in many miles of hedgerows. Common near coast in Norfolk and Suffolk, less frequent inland, and one Cambs record.

6. ANGLO-SAXON ELM *Ulmus anglosaxonica*

See also Note 2 at the end of the Keys.

38 Leaves tend to be longer and narrower, 1.7 - 2.2 times as long as wide. Teeth smaller, no more than 2.5mm deep, less jagged, primary teeth aligned with secondary, and outer tooth edges aligned with leaf margin. (Leaves 5-7 x 3-4cm, 1.7-2.2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 7-10mm.) Native; endemic. A few scattered records by roads in Cambs and Hunts.

21. LEATHERY-LEAVED ELM *Ulmus coriaceifolia*

38a Leaves often broader, (1.4-)1.5 - 2 times as long as broad. Teeth larger, those in apical third boldly triangular, up to 4mm deep. Primary teeth projecting further out than secondary, and tooth edges form an angle with leaf outline. **39**

39 Teeth fairly evenly graded from large in apical half to small in basal half. All leaves widest around the middle. **13. PROMINENT-TOOTHED ELM *U. prominentidens***
16. JAGGED-LEAVED ELM *U. longidentata*
26. NARROW-CROWNED ELM *U. multidentata*

Three very similar species. See Note 5 at the end of the Keys to distinguish.

39a Teeth conspicuously uneven, adjacent primary teeth often very different in size, some primary teeth little larger than next secondary tooth. Some leaves oblanceolate, clearly broadest in upper half. (Leaves 5-8 x 4-5cm, 1.4-2 times as long as wide (***not*** very round-leaved!), veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 5-10mm.) Native; endemic. Roadsides, hedgerows and field margins. Widespread in Norfolk and Suffolk, extending into Berks, Cambs, Northants, Leics and Salop.

14. ROUND-LEAVED ELM. *Ulmus pseudocoritana*

40 Leaves broadly rounded, 1.1-1.7 times as long as broad and often much less. Leaves often strongly marked with mite galls. **41**

40a Leaves narrower, some leaves 1.9 times as long as broad or narrower. **43**

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41 Leaves widest at middle, with rather irregular, often acute teeth. Leaves almost always strongly marked with mite galls. (Leaves usually rough but very rarely smooth forms are found). **42**

41a Leaves widest in upper half, with neat, rounded teeth. Leaves smooth, rarely with small mite galls. (Leaves 5-7 x 3-5cm, 1.2-1.7 times as long as wide, veins 11-17 on longer side, base asymmetrical by 2-8mm, petiole 6-11mm.) Native, Channel Islands and southern England, occasionally planted elsewhere.

4. JERSEY ELM *Ulmus wheatleyi*

42 Leaves with 10-13 veins on the longer side. Base of leaf asymmetrical by 1-4mm. (Leaves 5-8 x 3-6cm, 1.1-1.6 times as long as wide, veins 10-13 on longer side, base asymmetrical by 1-4mm, petiole 3-7mm.) ? Introduced. Hedgerows, roadsides, field margins, and by tracks and footpaths, often in river valleys. Widespread in southern half of England and in Cards and Pembs. Apparently commoner than *U. procera* in parts of central England. Perhaps introduced by Romans for vine support.

41. ATINIAN ELM *Ulmus proceriformis*

42a Leaves with 10-16 veins on longer side. Base asymmetrical by 2-8mm. (Leaves 6-9 x 4-7cm, 1.2-1.6 times as long as wide, veins 10-16 on longer side, base asymmetrical by 3-7mm, petiole 5-8mm.) Native. Formerly on roadsides, hedgerows, parks, field margins heaths, coppices and amenity areas. Still abundant in much of S and Central Britain, persisting as self-coppicing hedgerow shrubs.

40. ENGLISH ELM *Ulmus procera*

See also Note 8 at the end of the Keys

43 Leaves widest in upper half, looking 'broad-shouldered'. **44**

43a Leaves widest in middle, not looking particularly 'broad-shouldered'. **46**

44 Leaves larger, 5-10 x 3-4cm, often narrower, 1.7-2.3 times as long as wide. Primary teeth acute at tips. Most leaves obovate or oblanceolate, clearly broadest in the upper half. (Leaves 5-10 x 3-5cm, 1.7-2.3 times as long as wide, veins 11-20 on longer side, base asymmetrical by 2-8mm, petiole 6-13mm.) Native; endemic. Roadsides and field margins. Frequent in Hunts, extending into Cambs, Beds and Leics.

34. NARROW-LEAVED ELM *Ulmus oblanceolata*

See also Note 3 at the end of the Keys

44a Leaves smaller, no more than 7cm long, often broader, 1.2-2.2 times as long as wide. All teeth blunt and rounded at tips. **45**

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45 Some leaves broadest in middle, others slightly broader in upper half; narrower (1.5-2.2 times as long as broad), with very small asymmetry (1-3mm) and shorter petiole 5-8mm. (Leaves 5-7 x 3-4cm, veins 11-16 on longer side). Common in Cornwall and Devon, extending into Somerset, Dorset, with scattered records in Sussex, Middx and Bucks. **2. SMALL-LEAVED ELM Elm *Ulmus stricta***

45a Most leaves broadest in upper half, with neat, rounded teeth; leaves broader, 1.2-1.7 times as long as broad, often with larger asymmetry, 2-8mm, and longer petiole, 6-11mm. (Leaves 5-7 x 3-5cm, veins 11-17 on longer side). Native, Channel Islands and southern England, occasionally planted elsewhere.

4. JERSEY ELM *Ulmus wheatleyi*

See also Note 1 at the end of the Keys

46 Leaves larger, the longest on short shoots at least (8-)9cm long (doubtful species key both ways) **47**

46a Leaves smaller, the longest on short shoots no more than 7(-8)cm long (doubtful species key both ways). **59**

47 THREE CHOICES (doubtful cases key both ways)

47a Asymmetry of some leaves 10mm or more. **48**

47b Asymmetry often more than 6mm but never more than 9mm. **49**

47c Asymmetry a maximum of 6mm. **57**

48 Leaves larger, up to 10cm long, with shorter petioles (9-12mm) and asymmetry often less prominent; mid or dark green above, paler beneath. (Leaves 5-10 x 3-6cm, 1.5-2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 4-11mm, petiole 8.5-12mm.) Native; endemic. By roads, tracks and footpaths and in hedgerows and copses. Frequent, scattered, Norfolk, Suffolk and Cambs, extending to N Essex, Beds, Northants, Leics, Notts. **39. CORITANIAN ELM *Ulmus coritana***

48a Leaves no more than 8cm long, petioles often longer (9-20mm) and asymmetry often more prominent. Often strikingly pale yellow-green above, and even paler beneath. **11**

49 Leaves clearly broadest in basal half, long-tapered, with blunt, square or rounded teeth. (Leaves 5-9 x 3-5cm, 1.5-2 times as long as wide, veins 15-18 on longer side, base asymmetrical by 2.5-9mm, petiole 7-11mm.) Native; endemic. Hedgerows. Scattered in N Essex and solitary records in Norfolk and Cambs.

36. POINTED-LEAVED ELM *Ulmus acuminatissima*

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49a Leaves mostly broadest about the middle, teeth often acute and not appearing crenate. **50**

50 Underside of leaves glabrous or very nearly so, axillary tufts barely visible without a lens. Some leaves almost circular, 1.2-1.9 times as long as broad. Petioles often rather short, 4-9mm. Teeth of leaves wide square or rounded, fairly shallow, 3-7 x 3-6 x 1.3mm. Leaves often broadest in lower half, with a broad, rounded lobe on longer side at base. (Leaves 5-9 x 3-5cm, 1.2-1.9 times longer than broad, veins 14-21 on longer side, leaf asymmetrical by 2-9mm, petiole 4-9mm.) Roadsides and hedges, frequent in Cornwall, also found in Devon and Dorset.

46. FAT-LEAVED ELM *Ulmus obesifolia*

50a Underside of leaves visibly hairy, at least along main vein and in axils of side veins**.** Leaves in most species narrower, 1.4-1.8 (-2.3) times as long as broad. Petioles often longer. Teeth usually more pointed. **51**

51 Leaves rather broadly ovate, 1.4-1.8 times as long as wide. Teeth shallow but very broad, 4-8 x 4-7 x 1-4mm, obtuse or cuspidate, see illustration. (Leaves 6-9 x 4-6cm, 1.4-1.8 times as long as wide, veins 15-20 on longer side, base asymmetrical by 5-8mm, petiole 6-9mm.) Native; endemic. Roadsides in the north Essex and Cambs border country, Beds. **19. FAT-TOOTHED ELM *Ulmus obesidens***

51a Leaves more narrowly ovate or lanceolate, up to 2 (-2.3) times as long as broad. Teeth proportionately deeper. **52**

52 Leaves shorter and broader, rarely more than 1.8 times as long as broad, evenly rounded in outline. Leaves obtuse or mildly acute, with obtuse or squared teeth, many primary teeth having a secondary tooth almost as large. (Leaves 6-9 x 4-5cm, 1.6-1.8 (-2.1) times as long as wide, veins 13-16 on longer side, base asymmetrical by 4-8mm, petiole 9-13mm.) Native; endemic. Known only from Navestock Heath in S Essex and Pebmarsh in N Essex. **35. PEBMARSH ELM *Ulmus serratula***

52a Leaves often narrower, 1.8-2 (-2.3) times as long as broad, often rather angular in outline, either rhombic or with mid-sides straight and parallel. Primary teeth usually larger than their secondary teeth. **53**

53. Leaves no more than twice as long as broad, often rather straight-sided in middle, 5-9 x 3-7cm. Petioles rather shorter and stouter, 7-11mm. Teeth fairly shallow and square, rather uneven but with outer edge parallel with outline of leaf, not jutting out. (Leaves 5-9 x 3-7cm, 1.5-2 times as long as wide, veins 11-16 on longer side, base asymmetrical by 3.3-8.1mm, petiole 7-11mm.) Native; endemic. Hedgerows and streamsides around Boxted, W Suffolk. **33. TALL ELM *Ulmus alta***

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53a Leaves up to 2.3 times as long as broad, often neatly rhombic, widest in middle. Petioles often longer and not as thick. Teeth either even, or rounded, or jutting out. **54**

54 Teeth neat and regular, smaller, the largest 5-6mm long, often blunt and rounded. Petiole up to 10mm. (Leaves 5-8 x 3-4cm, 1.5-2.3 times as long as wide, veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 6-10mm.) Native; endemic. The characteristic elm of the Dengie Peninsula in south Essex. Also recorded from Bedfordshire. **24. PENINSULA ELM *Ulmus peninsularis***

54a Teeth angular, acute or obtuse, but not rounded and less blunt, sometimes very irregular, larger, up to 7-8mm long. Petiole often longer. **55**

55. Trunk often with numerous burrs or bosses which are often darker than the pale grey bark. Leaves up to 10cm long, up to 2.3 times as long as broad, often neatly rhombic, veins 13-20 on long side, teeth regular and even. (Leaves 6-10 x 3-5cm, 1.4-2.3 times as long as wide, veins 13-20 on longer side, base asymmetrical by 3-8mm, petiole 9-14mm.) Native; endemic. By tracks, field margins, ditches and roads and in hedgerows, copses and parks. Widespread in Cambs, Beds and Hunts, just extending into Northants. **18. BURRED ELM *Ulmus serratifrons***

See also Note 3 at the end of the Keys

55a Trunk rarely with burrs or bosses. Leaves up to 8cm long, up to 2 (-2.1) times as long as broad, not neatly rhombic, veins 12-17 on longer side, teeth often noticeably uneven. **56**

56 Teeth conspicuously uneven, adjacent primary teeth often very different in size, some primary teeth little larger than next secondary tooth. Some leaves oblanceolate, clearly broadest in upper half. Asymmetry lobe rather narrow. (Leaves 5-8 x 4-5cm, 1.4-2 times as long as wide (***not*** very round-leaved!), veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 5-10mm.) Native; endemic. Roadsides, hedgerows and field margins. Widespread in Norfolk and Suffolk, extending into Berks, Cambs, Northants, Leics and Salop. **14. ROUND-LEAVED ELM. *Ulmus pseudocoritana***

56a Teeth fairly evenly graded from large in apical half to small in basal half. All leaves widest around the middle. Asymmetry lobe rather broad, sometimes very large. **11**

57 Leaves more broadly oval, most leaves 1.6-1.8 times as long as broad. Teeth blunt, with rather square gaps between teeth, and in fresh specimens, teeth twisted away from plane of leaf. (Leaves 1.6-1.8 (-2) times as long as wide, veins 14-17 on longer side, base asymmetrical by 2-5mm, petiole 7-10mm.) Native; endemic. Known only from a number of trees in Madingley Wood, Cambs, and two trees between Abkettleby and Asfordby, Leics. **32. CUT-LEAVED ELM *Ulmus incisa***

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57a Leaves longer and narrower, 1.7-2 times as long as broad. Teeth less rounded and with triangular gaps between. **58**

58 Leaves often broadest in basal half and long-tapered, with broadly rounded asymmetry lobe on long side. Primary teeth obtuse, secondary about same size, so outer edges of teeth are parallel with leaf outline. Leaves often conspicuously dark green above contrasting with pale undersides. (Leaves 6-9 x 3-5cm, 1.7-2 times as long as wide, veins 12-16 on longer side, base asymmetrical by 2-6(-9)mm, petiole 9-11mm.) Native; endemic. In hedgerows and by tracks around Halstead, Essex, and in hedges and beside droves in Cambridgeshire fenland.

42. DARK-LEAVED ELM Elm *Ulmus atrovirens*

58a Leaves broadest about middle, and tapering as much below as above midpoint. Primary teeth more acute and secondary teeth smaller, so teeth appear more triangular and outer edges of teeth are at an angle to outline of leaf. Leaves mid green above, somewhat paler beneath. Leaves elliptical to oblong, with prominent rather jagged teeth. (Leaves 5-8 x 3-5cm, 1.8-2 times as long as wide, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 8-12mm.) Native; endemic. Hedgerows and copses. North Essex and west Suffolk.

26. NARROW-CROWNED ELM *Ulmus multidentata*

See also Note 3 at the end of the Keys

59 Asymmetry large, 5-15mm, petiole long to very long (10-20mm), leaves often conspicuously pale green above. **11**

59a Asymmetry smaller, up to 8mm. **60**

60 Teeth blunt, almost crenate, short shoots tend to keep elongating. 8-12 veins on long side. **27 ESSEX ELM *U. pseudelegantissima***

31 MIDLAND ELM *U. elegantissima*

See Note 4 at the end of the Keys to separate these two species and the rather similar Plot's Elm, *U. plotii.* **11**

60a Teeth more angular, not crenate. Short shoots do not elongate. Veins 12-17. **61**

61 Teeth conspicuously uneven, adjacent primary teeth often very different in size, some primary teeth little larger than next secondary. tooth. Some leaves oblanceolate, clearly broadest in upper half. Asymmetry lobe rather narrow. (Leaves 5-8 x 4-5cm, 1.4-2 times as long as wide (***not*** very round-leaved!), veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 5-10mm.) Native; endemic. Roadsides, hedgerows and field margins. Widespread in Norfolk and Suffolk,

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extending into Berks, Cambs, Northants, Leics and Salop.

14. ROUND-LEAVED ELM. *Ulmus pseudocoritana*

61a Teeth fairly evenly graded from large in apical half to small in basal half. All leaves widest around the middle. Asymmetry lobe rather broad. **62**

62 Petioles longer, some 10-12 (-14)mm. **63**

62a Petioles 4-10mm **65**

63 Leaves sometimes broader above midpoint, teeth in apical half broadly triangular, 4-8mm long, asymmetry large and bulging, 3-8mm or more, petiole 9-14mm. **11**

63a Leaves broadest in middle, teeth smaller and narrower, up to 6mm long, asymmetry 1-6mm, less bulging. **64**

64 Leaves longer and narrower on average, 1.8-2 times as long as broad, with more jagged teeth in apical third. (Leaves 5-8 x 3-5cm, veins 12-17 on longer side, base asymmetrical by 2-6mm, petiole 8-12mm.) Native; endemic. Hedgerows and copses. North Essex and west Suffolk.

26. NARROW-CROWNED ELM *Ulmus multidentata*

64a Leaves smaller and more rounded on average, 1.5-2 times as long as broad, with smaller, neater, less jagged teeth, rather reminiscent of crab-apple. (Leaves 5-7 x 3-4cm, veins 12-17 on longer side, base asymmetrical by 1-6mm, petiole 6-12mm.) Native; endemic. Hedgerows, roadsides and copses and by buildings. Scattered throughout Essex, especially in the south, and just extending into Cambs

9. DWARF-LEAVED ELM *Ulmus microdon*

65 Leaves longer and narrower: no leaves less than 1.7 times as long as broad. **15**

65a Leaves shorter and broader, some leaves 1.3-1.6 times as long as broad. **66**

66 Teeth in apical half of leaf triangular, their long edge at an angle with leaf outline. **67**

66a Teeth in apical half not triangular, either small and regular, square-ended or blunt and flattened, with outer edge aligning with outline of leaf. **68**

67 Leaves more tapered, apex acute-to-acuminate, petioles often shorter, 4-9mm. **37**

67a Leaves broadly rounded to a right-angled or slightly acute apex, petioles often longer, 7-10mm. (Leaves 5-7 x 3-4cm, veins 12-17 on longer side, base asymmetrical by 2-5mm.) Hedgerows, copses, woodland and roadsides, apparently confined to south Essex and also recorded from Cardiganshire.

20. LONG-TOOTHED ELM *Ulmus longidens*

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68 Leaves tending to be narrower, 1.5-2.3 times as long as broad. Teeth neat and regular, blunt and rounded or flattened, almost crenate, with regular V-shaped gaps between teeth. (Leaves 5-8 x 3-4cm, 1.5-2.3 times as long as wide, veins 12-17 on longer side, base asymmetrical by 3-8mm, petiole 6-10mm.) Native; endemic. The characteristic elm of the Dengie Peninsula in south Essex. Also recorded from Bedfordshire. **24. PENINSULA ELM *Ulmus peninsularis***

68a Leaves on average broader, 1.6-2 times as long as broad. Teeth blunt, with rather square gaps between teeth, and in fresh specimens, teeth twisted away from plane of leaf. (Leaves 5-8 x 3-6cm, 1.6-1.8 (-2) times as long as wide, veins 14-17 on longer side, base asymmetrical by 2-5mm, petiole 7-10mm.) Native; endemic. Known only from a number of trees in Madingley Wood, Cambs, and two trees between Abkettleby and Asfordby, Leics. **32. CUT-LEAVED ELM *Ulmus incisa***

69 Asymmetry less than 10mm (doubtful cases key both ways). **70**

69a Asymmetry more than 10mm. **73**

70 Leaves longer and narrower, 1.4-2.3 times as long as broad, lanceolate-rhombic. **22**

70a Leaves shorter and broader, 1.5-2(-2.2) times as long as broad, broadly rounded with a bulging asymmetry. **71**

71 Leaves 5-7 x 2-4cm, less asymmetrical (usually 0-4mm, occasionally -7mm), teeth more even, not conspicuously larger in apical half, leaves narrower on average**.** (Leaves 5-7 x 2-4cm, (1.4-)1.9-2.2 times as long as wide, veins 12-19 on longer side, base asymmetrical by 0-4mm, petiole 5-10(-12)mm.) Native; endemic. Roadsides and hedgerows in N Herts extending into Cambs and Essex.
5. CURVED-LEAVED ELM *Ulmus curvifolia*

71a Leaves often larger, 5-10 x 3-7cm, asymmetry often larger (4-11mm). **72**

72 All teeth bluntly serrate to right-angled, and less curved toward apex. Leaves often narrower, 1.5-2 times as long as broad. 12-17 veins on long side. Leaves not noticeably crowded. (Leaves 5-10 x 3-6cm, asymmetrical by 4-11mm, petiole 8.5-12mm.) Native; endemic. By roads, tracks and footpaths and in hedgerows and copses. Frequent, scattered, Norfolk, Suffolk and Cambs, extending to N Essex, Beds, Northants, Leics, Notts. **39. CORITANIAN ELM *Ulmus coritana***

72a Some teeth near apex of leaf acute, and more strongly curved toward apex. Leaves generally shorter and broader, 1.5-1.7 times as long as broad. 15-22 veins on long

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side. Leaves rather crowded on twigs. (Leaves 5-10 x 5-7cm, asymmetrical by 6-9mm, petiole 6-10mm). Hedgerows and valleys. Widespread in Cornwall, extending into Devon, with scattered records from Herefordshire, Cardiganshire, Hertfordshire, Bucks, Suffolk, Norfolk, Cambs. **52. DAVEY'S ELM *Ulmus daveyi***

73 Flowers and fruits on long stalks, which often remain like tufts of blackish wires over the summer. Teeth finely pointed and strongly curved toward apex. (Leaves 4-12 x 3-6cm, 1.6-2.1 times as long as wide, veins 17-21 on longer side, base asymmetrical by 3-7(-12)mm (acc. S&M; my samples are 9-17mm), petiole up to 5(-7)mm (acc. S&M; mine are 6-11mm). Introduced, rarely planted and occasionally self-seeding, e.g. by car park at Fineshade, Northants.

22. EUROPEAN WHITE ELM *Ulmus laevis*

73a Flowers and fruits almost sessile; teeth coarser and less curved. **74**

74 Longest leaf 10cm or less; longest asymmetry 11mm; longest petiole 12mm. Base of leaf on shorter side not sinuate, lowest vein not exposed. **72**

74a Longest leaf often more than 10cm; longest asymmetry 13-18mm; longest petiole 13-16mm. Base of leaf on shorter side often sinuate, as lowest vein is exposed for (no lamina on lower side for first 1-4mm). **75**

75 Leaves generally broader and shorter: 7-14 x 4-8cm, 1.5-1.8 times as long as broad, tapering to an acute or slightly acuminate apex, veins 13-21 on longer side, lamina asymmetry 4-13mm, petiole 6-13mm.) Native, perhaps endemic. Roadsides, hedgerows, copses and parks. Widely distributed from Cornwall to East Anglia, north to Yorkshire and south Wales. **59. DUTCH ELM *Ulmus hollandica***

75a Leaves generally longer and narrower: 8-16 x 5-9cm, 1.5-2 times as long as wide, tapering to an acuminate apex, veins 12-22 on longer side, lamina asymmetry 6-18mm, petiole 9-16mm. Native. Said to originate in Hinchingbrook Park, Hunts, now widely planted, frequent in hedges, wood margins and modern roadside plantings.

53. HUNTINGDON ELM *Ulmus vegeta*

***See Note 10 at the end of the Keys. If leaves are broader, 1.2-1.6 times as long as broad, see* 54 *U. platyphylla* (included in Note 10).**

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Notes and tables for tricky species-groups

These rough notes are a work in progress. They started with Sell & Murrell's features and are gradually being expanded with my own experience, with others' testing of the keys, and with information from other sources too. For *U. hollandica* and *U. vegeta* I have included the disagreements between publications as a warning.

This is still a work in progress. I need to study more specimens of each group of species and find new features for many of them. The plan is to illustrate the other notes like Note 7 is already illustrated In the meantime, compare the species in each note with the next section, Descriptions and Illustrations (which are arranged by species number)

Note 1: 1 Cornish Elm *U. cornubiensis,* 2 Small-leaved Elm *U. stricta, ,* 3 Goodyer's Elm *U.sativa,* 4 Jersey Elm *U. wheatleyi*

These are the four smallest-leaved British elms. All are smooth-leaved and with broadly oblanceolate leaves, tending to have 'broad shoulders'.

Illustrations will show a large leaf, a small leaf, the extremes of teething, and the range of leaf bases, from mature leaves on short shoots in full sun. Leaves on long shoots will often be more tapered and with more jagged teeth.

Features	***1 cornubiensis***	***2 stricta***	***3 sativa***	***4 wheatleyi***
Leaf size/cm	2-4 x 1.5-2	5-7 x 3-4	3-6 x 2-4	5-7 x 3-5
Length:breadth	1.5-2	1.5-2.2	1.5-2	1.2-1.7
No. Veins	9-12	11-16	9-15	11-17
Anymmetry/mm	0-2	1-3	1-4	2-8
Petiole/mm	2-6	5-8	4-11	6-11
Teeth length/mm	3-4	4-7	3-6	4-7
Teeth diag/mm	3-4	4-7	3-5	4-7
Teeth depth/mm	1-2	2-3	1.5-3	2-4

Note that many Cornish botanists regard '*cornubiensis*' as simply small-leaved forms of *U. stricta* growing in stressed conditions, or even small-leaved samples from trees of *U. stricta,* and refer to *U. stricta* as Cornish Elm.

Note 2: 6 Anglo-saxon Elm *Ulmus anglosaxonica* and 28 East Anglian Elm *U. diversifolia*

These two small-medium leaved smooth elms have rhombic leaves with fairly prominent triangular teeth on some of their leaves. That applies to most or all leaves of *U. anglosaxonica,* and to the larger leaves of *U. diversifolia*. The two are barely separable on standard measurements (the larger-leaved 16 Jagged-leaved Elm *U. longidentata* is included for comparison, though it's not likely to be confused):

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Feature	6 Anglo-Saxon Elm *U. anglosaxonica*	28 East Anglian Elm *U. diversifolia*	16 Jagged-leaved Elm *U. longidentata*
Leaf blades (cm)	4-7 x 2-4 cm	4-7 x 3-4	6-9 x 3-5
Length-width ratio	1.5 – 2	1.3-2.1	1.7-2
Blade asymmetry (mm)	1-4	1-5	2-6
Veins	11-15	11-6	13-22
Petiole (mm)	4-9	4-9	6-10
Teeth (mm)	4-6 x 4-6 x 2-4	5-7 x 4-7 x 2-4	4-6 x 4-6 x 2-4
Distribution	Heaths, commons, churchyards and stream sides, by roads, tracks and fields, and in many miles of hedgerows. Common near coast in Norfolk and Suffolk, less frequent inland, and one Cambs record.	Roadsides, hedgerows and copses. Widespread in Essex, Herts, Suffolk, Norfolk and Cambs.	Roadsides, hedges, copses and field margins, locally abundant in Huntingdonshire, also extending into Cambs fenland.

<u>Note 3:</u> 10 Cambridge Elm *Ulmus minor s.s.,* 18 Burred Elm *U. serratifrons,* 26 Narrow-crowned El, *U. multidentata* and 34 Narrow-leaved Elm *U. oblanceolata*

These four smooth species have moderately large neatly lanceolate-rhombic leaves. Although there are small differences in their basic measurements, these overlap substantially and will probably do so more as a wider range of material is examined.

Features	10 Cambridge Elm *U. minor s.s.*	18 Burred Elm *U. serratifrons*	26 Narrow-crowned Elm *U. multidentata*	34 Narrow-leaved Elm *U. oblanceolata*
Leaf size/cm	5-10 x 3-5	6-10 x 3-5	5-8 x 3-5	5-10 x 3-5
Length:breadth	1.7-2.5	1.4-2.3	1.8-2	1.7-2.3
No. Veins	10-21	13-20	12-17	11-20
Asymmetry/mm	2-10	3-6	2-6	2-8
Petiole/mm	7-14	9-14	8-12	6-13
Teeth length/mm	4-8 x 4-7 x 2-3	4-7 x 4-7 x 2-3	4-6 x 3-6 x 2-3	3-7 x 3-7 x 1-3

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Note 4: 11 *Ulmus plotii* Plot's Elm, 27 *U. pseudelegantissima* Essex Elm, 31 *U. elegantissima* Midland Elm

These three species have smallish, smooth leaves, some of which have rounded rather than serrate teeth, and all have a strong tendency to short shoots continuing to grow. Even on intact maiden trees and in early summer, most shoots will be elongating and producing new leaves, as if they had permanent Lammas growth. (Actual Lammas growth on these species is very narrow-leaved and rough and hairy, and grows at the tips of shoots with typical broader smooth leaves.)

Feature	*Ulmus plotii*	*Ulmus pseudelegantissima*	*Ulmus elegantissima*
Leaf blades (cm)	4-6 x 2-4 cm	4-7 x 3-4	5-7 x 3-5
Length-width ratio	1.3 – 2.3	1.5 - 2	1.7-2
Blade asymmetry (mm)	4-10	2-4	Slight or cordate, 2-4 (-6)
Veins	8-14	9-12	8-12
Petiole (mm)	1-4 (-6)	(4-)6-9	(5-)6-10
Teeth (mm)	4-7 x 4-7 x 2-3	5-8 x 5-8 x 2-3	5-5.5 x 3.5-5 x 1.5-3 (JVA) (S&M: 4-5 x 2.5-3 x 1-3)
Branches	Fairly massive lower pendulous, upper one-sided and floppy or pendulous	Fairly slender, lower spreading, upper ascending	Fairly massive, undulate, ascending
Distribution	Scattered, mainly Welsh border to Fens and Wiltshire to Humber	Apparently confined to North Essex	Leicestershire, locally frequent; scattered in Suffolk Glos, Edinburgh

Note that tooth size given in Sell & Murrell for *U. elegantissima* is smaller than on specimens, and differs from the figures in Armstrong's thesis ('JVA'). Size ranges for petiole length are wider than given by Sell & Murrell (wider range from my measurements). Although leaf size, asymmetry and petiole lengths do overlap, the differences between the three species are apparent when samples are compared side by side.

Note 5: 13 Prominent-toothed Elm *Ulmus prominentidens,* 16 Jagged-leaved Elm *U. longidentata,* 26 Narrow-crowned Elm *U. multidentata* and 49 Large-toothed Elm *U. prionophylla*

This group of four smooth elms have rhombic-lanceolate leaves with an acuminate apex and rather jagged triangular teeth in the upper third. They overlap substantially in their basic measurements, though *U. longidentata* and *U. prionophylla* have noticeably larger leaves with more veins, *prionophylla* is often more elongate, paler green and with larger teeth, and *multidentata* has rather longer petioles.

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Features	**13 Prominent-toothed Elm *U. prominentidens s.s.***	**16 Jagged-leaved Elm *U. longidentata***	**26 Narrow-crowned Elm *U. multidentata***	**49 Large-toothed Elm *U. prionophylla***
Leaf size/cm	5-8 x 3-4	6-9 x 3-5	5-8 x 3-5	6-9 x 3-5
Length:breadth	1.5-2	1.7-2	1.8-2	1.6-2.4
No. Veins	12-18	13-22	12-17	13-21
Asymmetry/mm	3-8	2-6	2-6	2-6
Petiole/mm	5-10	6-10	8-12	6-9
Teeth length/mm	4-8 x 4-7 x 2-4	4-6 x 4-6 x 2-4	4-6 x 3-6 x 2-3	6-9 x 4-8 x 2-4

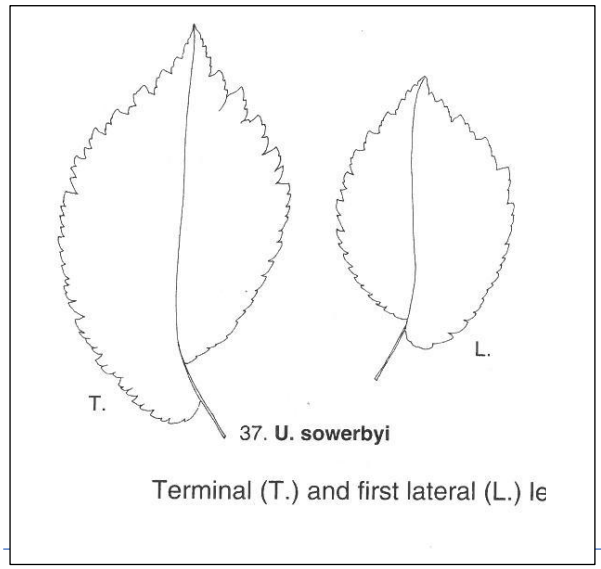
Note 6: 37 Sowerby's Elm *Ulmus sowerbyi* and 38 Pale-leaved Elm *U. asymmetrica*

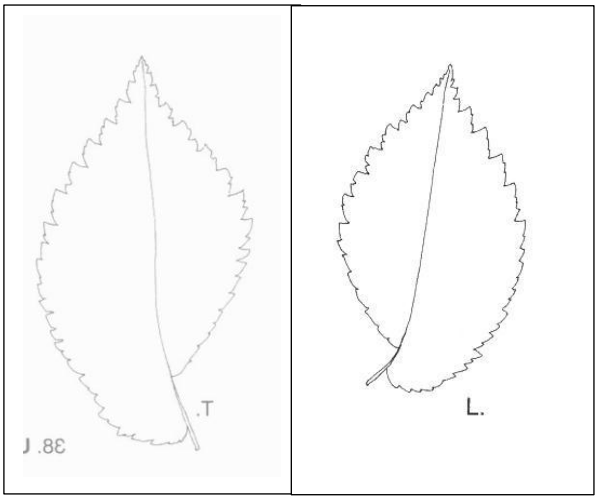
It seems that *U. sowerbyi* as illustrated and described in *Sell & Murrell's Flora* Is a distinctive elm which is closest to, but probably differs from, *U. asymmetrica.*

Status of *U. sowerbyi*

Ulmus sowerbyi was originally described by C E Moss under the name *U. nitens var. sowerbyi* in his Cambridge British Flora in 1914. He is quoted in Sell & Murrell, and in Armstrong's thesis, as saying it was 'common in hedgerows and parklands in eastern England and the eastern Midlands, chiefly on clay and alluvial soil… thought to be indigenous to Essex, Suffolk, Cambridgeshire, Huntingdonshire, Northamptonshire, and a few other eastern and south-eastern counties'. It is unclear which other elm microspecies Moss would have included under his *sowerbyi.* I have seen no recent specimens in the Cambridge herbarium, none collected by Armstrong, and only one (from 1955) by Peter Sell. I have found a few trees in Cambs and rather more in Herts which I tentatively identify as *sowerbyi.*

The illustrations in Sell & Murrell suggest the two species are very similar:





38 U. asymmetrica

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Line drawings of *U. sowerbyi* and *U. asymmetrica* leaves from Sell & Murrell (2018). I have reversed the illustration of the terminal leaf of *U. asymmetrica* to make them comparable. *U. sowerbyi* 'terminal' is actually a second lateral leaf, albeit the largest on its shoot.

Comparing the descriptions in Sell & Murrell highlights a few apparent differences, though many are not easy to apply. Comparing with specimens determined by Sell or Armstrong (including the one in Armstrong's thesis, from which Sell & Murrell's drawings were made), some measurements exceed the published ranges, so any apparent difference should be used cautiously.

37 *U. sowerbyi* sensu Sell & Murrell	**38 *U. asymmetrica***
Crown broadly domed, trunk extending up to three-quarters of the way through the crown.	Crown dome-shaped, sometimes buttressed at base, trunk extending up to one-third of the way through the crown.
Young shoots with a few simple eglandular hairs and with fairly numerous orange or cream glandular hairs (bud scales with fairly numerous eglandular and glandular hairs)	Young shoots glabrous or with fairly numerous simple hairs (bud scales with eglandular and glandular hairs).
Leaves of short shoots 6-8 x 3-4cm, 1.8-2.1 times longer as broad,	**Leaves of short shoots** 5-8 x 3-5cm, 1.5-2 times longer than broad,
medium yellowish-green above, paler beneath,	pale yellowish-green above, paler beneath
elliptical or obovate, acuminate at apex	narrowly to broadly elliptical, shortly acute or acuminate at apex
Lamina asymmetrical at base by 3-8mm [-10mm on JVA thesis specimen]	Lamina usually markedly asymmetrical at base by 5-15mm
Veins 13-16 on longer side	Veins 14-17 on longer side
Petiole 9-14mm	Petiole 10-20mm

Comparing the two plates from Armstrong, and also the *descriptions* in Sell & Murrell (but not the *key*) a potential identification couplet might be:

> Leaves of short shoots ***mid green*** above, 6-8 x 3-4cm, ***1.8-2.1 times*** longer as broad, elliptical or obovate, acuminate at apex (***often broadest in upper half***), ***asymmetrical at base by 3-8(-10)mm***, veins 13-16 on longer side, ***petiole 9-14mm***. Teeth in apical third larger, more prominent and distinctly irregular. Young shoots with a few eglandular hairs and ***fairly numerous orange or cream glandular hairs***. **Sowerby's Elm, *U. sowerbyi***
>
> Leaves of short shoots ***pale green*** above, 5-8 x 3-5cm, ***1.5-2 times*** longer than broad, narrowly to broadly elliptical (***mostly broadest at about the middle***), shortly acute or acuminate at apex, usually markedly ***asymmetrical at base by 5-15mm***, veins 14-17 on longer side, ***petiole 10-20mm***. Teeth in apical third smaller, more regular. Young shoots with ***fairly numerous eglandular hairs only***. **Pale-leaved Elm, *U. asymmetrica***

I have samples which I tentatively identify as *U. sowerbyi* where, although most leaves are less than 10mm asymmetrical, a few (on vigorous, rather elongate 'short shoots') are 13-14mm asymmetrical.

To add to the confusion, there is a specimen collected by C E Moss in 1913, the year before he described *U. nitens var sowerbyi,* which appears to be another species, not included in Sell & Murrell. I describe this as species 37b in the Descriptions and illustrations (p. 113). A photograph of

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the specimen which can be zoomed into is here:
https://www.flickr.com/photos/cladoniophile/50775501123/

Note 7: 43 Hayley Elm *U. crenata,* 44 Madingley Elm *U. madingleyensis,* 48 Woodland Elm *U. cantabrigiensis*

These three rough-leaved elms with broadly lanceolate-ovate medium-size leaves and often a small asymmetry, are largely confined to ancient woodland in Cambridgeshire. The tabulation of the basic features used in the key show why they are difficult to separate with simple couplets: none of the numerical features differ significantly.

Feature	**43 Hayley Elm** ***U. crenata***	**44 Madingley Elm** ***U. madingleyensis***	**48 Woodland Elm** ***U. cantabrigiensis***
Leaf length, min-max, cm	5-10	5-11	6-10
Leaf breadth, min-max, cm	3-6	3-6	4-6
L-B ratio, min-max	1.5-2	1.5-2	1.5-2
Veins min-max	11-19	13-20	12-17
Asymmetry min-max, mm	1-6	2-7	1-4
Petiole min-max, mm	7-10	5-12	6-11
Teeth, mm	3-6 x 3-6(-7) x 1-3	4-7 x 4-7 x 2-4	4-6 x 4-6 x 2-4

The best features are overall leaf shape and toothing:

> **43 Hayley Elm *U. crenata:*** variable in shape, the larger terminal leaves often longer and narrower than in the other species, with more teeth, often around 30 primary teeth on each side. Smaller leaves often broadest near the base, which is often cordate. Leaves are generally acute at the tip, with little or no hint of acuminate tapering. Some leaves have definitely rounded leaves and appear crenate.
>
> **44 Madingley Elm *U. madingleyensis:*** fairly uniform in shape, usually broadly ovate with a cuspidate or short-acuminate apex, and angular teeth which may curve toward the apex. These are fairly few in number, a typical terminal leaf having around 25 primary teeth on each side.
>
> **48 Woodland Elm *U. cantabrigiensis:*** rather more rhombic-ovate with a long-acuminate apex, with teeth which sometimes become quite jagged-triangular in the apical half. Teeth fewer than *crenata,* typically about 25 primary teeth on each side of a terminal leaf.

The illustrations show a large leaf, a small leaf, the extremes of teething, and the range of leaf bases, from mature leaves on short shoots in full sun. Leaves on long shoots will often be more tapered and with more jagged teeth.

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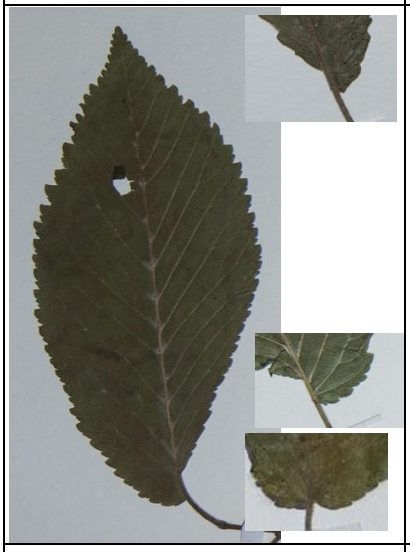
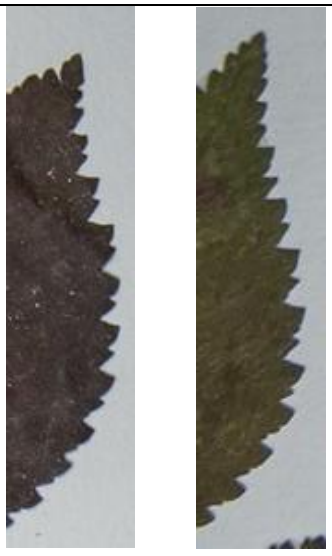
43 U. crenata	*44 U. madingleyensis*	*48 U. cantabrigiensis*
		
		
		

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Note 8: 40 *Ulmus procera* English Elm, 41 *U. proceriformis* Atinian Elm and 56 Corky-barked Elm *U. gyrophylla*

The two English Elm look-alikes are both rough-leaved, round-leaved and smallish-leaved. Both are very prone to attach by gall-mites which cause small rounded swellings on the upper surface of the leaves. Corky-barked Elm, *U. gyrophylla,* is probably the only species likely to be confused with them, as small-leaved samples may be rather similar.

Feature	**40 English Elm *U. procera***	**41 Atinian Elm *U. proceriformis***	**56 Corky-barked Elm *U. gyrophylla***
Leaf length, min-max, cm	6-9	5-8	7-12
Leaf breadth, min-max, cm	4-7	3-6	4-7
L-B ratio, min-max	1.2-1.6	1.1-1.6	1.2-1.8
Veins min-max	10-16	10-13	15-19
Asymmetry min-max, mm	3-7	1-4	4-8
Petiole min-max, mm	5-8	3-7	5-11
Teeth, mm	5-8 x 5-8 x 2-4	5-9 x 4-8 x 3-5	5-7 x 5-8 x 2-4

The three should key out fairly well, but *procera* and *proceriformis* can be tricky, and it is unsatisfactory if all the differences are small and size-related.

56 Corky-barked Elm *U. gyrophylla:* larger-leaved, some leaves more ovate than round, with more tapered, definitely acuminate, leaves, with longer and more slender petioles. It far less often has large numbers of the 1-2mm pouches or pimples caused by the gall-mite *Aceria campestricola* (formerly *Eriophyes ulmi).*

The other two have more round leaves, smaller and almost always heavily pocked with gall-mites.

40 English Elm *Ulmus procera*: Asymmetry larger (3-7mm), veins can be more numerous (10-16), petiole generally longer 5-8mm.

41 Atinian Elm *U. proceriformis:* Asymmetry smaller (1-4mm), veins often fewer (10-13), petiole often shorter, 3-7mm.

In the field, it is probably easiest to look for the most asymmetrical leaves on short shoots, and if the asymmetry is clearly above 5mm, it's probably *procera.*

Note 9: 51 Western Elm *U. occidentalis,* 56 Corky-barked Elm *U. gyrophylla,* and 57 Scabrid Elm *U. scabrosa*

These three rough-leaved elms have medium-large leaves, too small for Wych elms *U. scabra/glabra* and their relatives, too large, elongate and toothy for English/Atinian Elms *U. procera/proceriformis.* Western and Scabrid are south-western species, Corky-barked mainly East Anglian but with a wider scatter of records. All three are recorded from Cardiganshire

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(the only well-recorded Welsh county for elms) suggesting they may be more widespread than current records, and could well overlap more.

The three are not easy to tell apart. Western Elm has slightly smaller leaves which are generally shorter, broader and less acuminate at the apex. Scabrid Elm has more elongate leaves and slightly larger teeth. Corky-barked Elm is intermediate between the two, with teeth less prominent than in Scabrid, and leaf apex on average a little longer-tapered than the other two.

Feature	**51 Western Elm *U. occidentalis***	**56 Corky-barked Elm *U. gyrophylla***	**57 Scabrid Elm *U. scabrosa***
Leaf length, min-max, cm	6-11	7-12	7-12
Leaf breadth, min-max, cm	4-7	4-7	4-7
L-B ratio, min-max	1.4-1.7	1.2-1.8	1.5-2
Veins min-max	11-20	15-19	10-20
Asymmetry min-max, mm	2-8	4-8	4-8
Petiole min-max, mm	3-9	5-11	5-11
Teeth, mm	5-7 x 5-7 x 2-4 Variable from definitely acute to slightly obtuse; larger primary teeth mostly with 1-2 additional secondary teeth	5-7 x 5-8 x 2-4 Mostly about right-angled and slightly cuspidate; larger primary teeth with 2-3 additional secondary teeth	5-9 x 5-9 x 2-4 Mostly acute and curving slightly toward apex; larger primary teeth with 3-4 additional secondary teeth
Distribution	Hedgerows by roads, tracks and fields. Common in Cornwall, just extending into Devon. Numerous records from Cardiganshire.	By roads and tracks and in hedgerows and copses. Widespread in Norfolk, Suffolk and Leics, outliers in Wilts, Sussex, Essex, Monmouth, Herefs, Cards and Yorks.	Hedgerows and copses, by tracks and roads, in woods and along beaches, frequent in southern Cornwall, scattered records elsewhere in Cornwall, one record from Devon and a few in Cardiganshire.

<u>Note 10:</u> 53 Huntingdon Elm *Ulmus vegeta,* 54 Bassingbourn Elm *U. platyphylla* and 59 Dutch Elm *U. hollandica*

These species are large-leaved elms with long petioles and big bulging asymmetries. They are also unusual in often having a sinuate base to the short side of many leaves, which curves up from the petiole, then loops downward before curving up again: this is caused by the lowest vein being exposed (no lamina on its lower side) for 1-4mm, as shown in the naming-of-parts figure on page 13.

The three are usually quite distinctive. *U.vegeta* and *U. hollandica* have rather glossy, eventually fairly smooth, leaves. They may start the year with roughish upper surfaces to the leaves, and shade leaves are often rough all year. *U. hollandica* often remains somewhat rough throughout, but I

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would advise caution in using 'rough = *hollandica,* smooth = *vegeta*' without corroborative features. Small-leaved examples of these two can be confused with large-leaved *U. coritana,* but that species has only 12-17 veins on the longer side of leaves, whereas *U. vegeta* and *U. hollandica* have 12-21 veins (if you count the short ones in the acute or acuminate apical point of the leaf).

U. platyphylla is surprisingly distinctive, generally smaller-leaved and shorter-petioled than *hollandica,* but seems to remain very rough throughout the summer.

The definitions of *hollandica* and *vegeta* taxa vary significantly between different works, so a name really needs a source attaching to it to be meaningful. The following table compares the features given by Melville (in Clapham, Tutin & Warburg 1952), Sell & Murrell (2018) and Stace (2019). In my experience the distinction used by Sell & Murrell, that *vegeta* has smooth leaves and *hollandica* has rough leaves often does not work, at least after the middle of July, by which time most *hollandica* are fairly smooth. I think leaf shape and length-width ratio is a better feature.

Other large-leaved smooth-leaved elms may belong in the '*hollandica* group', especially if the bare first vein is a reliable character. They are probably of hybrid origin, between one of the Wych Elms (probably mostly *U.scabra*) and one of the Field Elms (*U. minor s.l.*). It is tempting to speculate on the parentage of some species, especially where they show features suggestive of a particular *'minor'* elm:

> *U. insularum:* described from and perhaps confined to the Channel Islands, where *U. scabra* is probably the main or only Wych Elm, and *U. wheatleyi* is the common small-leaved elm, with very small leaves and shallow, broad, blunt teeth. *U. insularum* has smaller leaves than *hollandica* and *vegeta,* and has shallower, broader and blunter teeth.
>
> *U. daveyi:* mainly south-western, where *U. scabra* is fairly frequent, and the commonest smooth-leaved elm is *U. stricta.* It is smaller-leaved, more rounded, and shorter-acuminate than *hollandica* and *vegeta.*
>
> *U. platyphylla:* apparently confined to southern Cambridgeshire, a smaller-leaved, very round-leaved taxon, with very broad and rather shallow teeth. There are very many *U. minor* segregates in the area, including the broad, round-leaved *U. coritana,* as well as *U. procera* and *U. proceriformis.*

Feature	**53 Huntingdon Elm** ***Ulmus vegeta***	**59 Dutch Elm** ***Ulmus hollandica***	**54 Bassingbourn Elm** ***U. platyphylla***
Upper surface of leaf	Smooth and glabrous (S&M) Minutely scabrid (Melville) Smooth (Stace)	Scabrid (S&M) Minutely scabrid, finally shining, glabrous (Melville) Smooth (Stace)	Persistently scabrid
Leaf blades (cm)	8-16 x 5-9 (S&M) 6-12cm long (Melville)	7-14 x 4-8 (S&M) 8-15cm long (Melville)	7-13 x 6-8
Length-width ratio	1.5-2 (S&A) Almost 2 (Stace)	1.5-1.8 (S&A) Distinctly <2 (Stace)	1.3-2.1 [-1.6 acc JVA]

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Leaf shape	Elliptical or sometimes ovate to oblong-ovate, acuminate at apex (S&M) Ovate to ovate-lanceolate, *acuminate* (Melville) Acuminate at apex (Stace)	Elliptical to slightly obovate, acuminate at apex (S&M) Ovate, *acute* (Melville) Acute to shortly acuminate at apex (Stace)	Broadly ovate to obovate, acute, acuminate or cuspidate at apex.
Blade asymmetry (mm)	6-18 (S&M)	4-13 (S&M)	2-9
Veins	12-22 (S&M), 12-18 (Stace)	13-21 (S&M), 10-14 (Stace)	9-16
Petiole (mm)	9-16 (S&M)	6-13 (S&M)	6-11
Suckers	Less numerous and not corky-barked (Melville)	Suckers and epicormic shoots numerous, with corky flanges	Usually present.

<u>Note 11:</u> 47 Laxton Elm *U. crassa,* 50 Moss's Elm *U. mossii,* 5and 3 Exeter Elm *U. exoniensis,* 60 *Ulmus scabra* Wych Elm, 61 *U. glabra* Northern Wych Elm, 62 Camperdown Elm *U. camperdownii*

All these rough-leaved elms with large or very large leaves, short petioles often overlapped by the asymmetry lobe could be confused, but the features in the keys should separate them. They divide into two groups, the medium-large species and the huge species, which are both tabulated below.

Feature	**47 Laxton Elm *U. crassa***	**50 Moss's Elm *U. mossii***	**53 Exeter Elm *U. exoniensis***
Leaf length, min-max, cm	8-12	10-15	8-11
Leaf breadth, min-max, cm	3-6	6-9	6-8
L-B ratio, min-max	1.8-2.6*	1.5-2	1.3-1.5
Veins min-max	21-24	16-26	17-19
Asymmetry min-max, mm	4-7	2-8	7-9
Petiole min-max, mm	6-9	3-7	5-10
Teeth, mm	3-5 x 3-5 x 1-3	3-13(-23) x 5-9(-15) x 1-5 (-10)	6-12 x 5-8 x 3-6

*given as 2-3 in Sell & Murrell, the type tree has some much broader leaves; this range comes from Jayne Armstrong's thesis.

So, 47 *U. crassa* is narrow-leaved, somewhere between 60 *U. scabra* and 61 *U. glabra,* whereas 50 *U. mossii* and 53 *U. exoniensis* are shorter- and broader-leaved. *U. mossii* is recognised by the glandular-tipped hairs on the young shoots, and also sometimes has longer apical and subapical teeth than any other species (even larger than the shoulder-teeth of *scabra* and *glabra* and the

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curved ‘crab-claw’ teeth which are typical of *exoniensis*). *U. exoniensis* often has rather curled-up leaves, and when not, the long curved teeth are distinctive.

Feature	**60 Southern Wych Elm *Ulmus scabra***	**61 Northern Wych Elm *Ulmus glabra***	**62 Camperdown Elm *Ulmus camperdownii***
Leaf blades (cm)	8-17 x 4-11	10-18 x 4-9	14-18 x 8-11
Length-width ratio	1.6-2.2 S&A (1.5-2.1 BE)	2-3 (S&A) 1.7-2.6 (BE, type locality)	1.6-1.8
Midrib asymmetry (mm)	0-4 (-7)	1-10	3-10
Blade asymmetry (mm)	2-8	3-13	11-14
Veins	16-26	17-27	18-25
Petiole (mm)	3-7	3-6	8

The two Wych Elms seem to be fairly distinctive. Larger leaved than any other wild species, high-shouldered rough leaves, some of which have a prominent pair of shoulder teeth. Suckering leaves reach 20cm long, and even ‘short shoot’ leaves can be 13-14cm long. The two should key out fairly easily on averages of length: breadth (*scabra* 1.6-2.2, *glabra* 2-3) and asymmetry length (*scabra* 2-8mm, *glabra* 3-13mm), and they generally look very different, *glabra* leaves being reminiscent of a leaf segment of a horse-chestnut and *scabra* far broader.

Camperdown Elm *U. camperdownii* is usually very distinctive not only because of the huge leaves which are much broader than any other species, but also because of the ‘weeping’ growth form. Beware the weeping form *pendula* of *U. glabra,* which seems to have larger leaves than wild-type *glabra,* but these are still very long and narrow, 2-3 times as long as wide.

Sell & Murrell species versus Stace’s *Flora*

Many serious botanists who record their local plant species follow Stace’s Flora (2019), so it is probably useful to show how the much larger number of elms in Sell & Murrell’s *Flora* (and in this guide) relate to the names which Stace uses.

A preliminary synonymy of Stace and Sell & Murrell elm names

This table attempts to link the broad names used Stace’s Flora (2019) and the narrower names used by Sell & Murrell (2018). It is based entirely on the *appearance* of the elms, and how they might ‘key out’.

A few Sell & Murrell species, marked *, could be placed in more than one Stace species, depending on the relative importance placed on different identification features.
For a few Stace hybrid categories, marked ?????, there is no Sell & Murrell species which I would need to place there.

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Stace no.	*Stace name*	*Sell & Murrell no.*	*Sell & Murrell name*
1	***Ulmus glabra***	47	*U. crassa*
		50	*U. mossii*
		55	*U. exoniensis*
		60	*U. scabra*
		61	*U. glabra*
		62	*U. camperdownii*
2	***U. x vegeta***	53	*U. vegeta*
		49	*U. prionophylla**
3	***U. x hollandica***	52	*U. daveyi**
		54	*U. platyphylla*
		58	*U. insularum*
		59	*U. hollandica*
4	***U. procera***	40	*U. procera*
		41	*U. proceriformis*
		56	*U. gyrophylla**
5	***U. minor***		
5a	***U. minor ssp. minor***	5	*U. curvifolia*
		6	*U. anglosaxonica*
		7	*U. angustiformis*
		8	*U. rasilis*
		9	*U. microdon*
		10	*U.minor s.s.*
		12	*U. serrata*
		13	*U. prominentidens*
		14	*U. pseudocoritana*
		15	*U. acutissima*
		16	*U. longidentata*
		17	*U. sylvatica*
		18	*U. serratifrons*
		19	*U. obesidens*
		20	*U. longidens*
		21	*U. coriaceifolia*
		23	*U. cuneiformis*
		24	*U. peninsularis*
		25	*U. rhombifolia*
		26	*U. multidentata*
		27	*U. pseudelegantissima**
		28	*U. diversifolia*
		29	*U. longicaudata*
		30	*U. chaterorum*
		31	*U. elegantissima**
		32	*U. incisa*
		33	*U. alta*
		34	*U. oblanceolata*

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		35	*U. serratula*
		36	*U. acuminatissima*
		37	*U. sowerbyi*
		38	*U. asymmetrica*
		39	*U. coritana*
		42	*U. atrovirens*
		49	*U. prionophylla**
5b	***U. minor ssp. angustifolia***	3	*U. sativa*
5c	***U. minor ssp. cornubiensis***	1	*U. cornubiensis*
		2	*U. stricta*
5d	***U. minor ssp. sarniensis***	4	*U. wheatleyi*
6	***U. plotii***	11	*U. plotii*
		27	*U. pseudelegantissima**
		31	*U. elegantissima**
7	***U. laevis***	22	*U. laevis*
1 x 4	***U. glabra x procera***	51	*U. occidentalis*
		57	*U. scabrosa*
		56	*U. gyrophylla**
		46	*U. obesifolia*
1 x 5	***U. glabra x minor***	45	*U. pseudobovata*
		49	*U. prionophylla**
		52	*U. daveyi**
1 x 6	***U. glabra x plotii***	?????	
4 x 5	***U. procera x minor***	48	*U. cantabrigiensis*
		44	*U.madingleyensis*
		43	*U. crenata*
4 x 6	***U. procera x plotii***	?????	
5 x 6	***U. minor x plotii***	27	*U. pseudelegantissima**
		31	*U. elegantissima**

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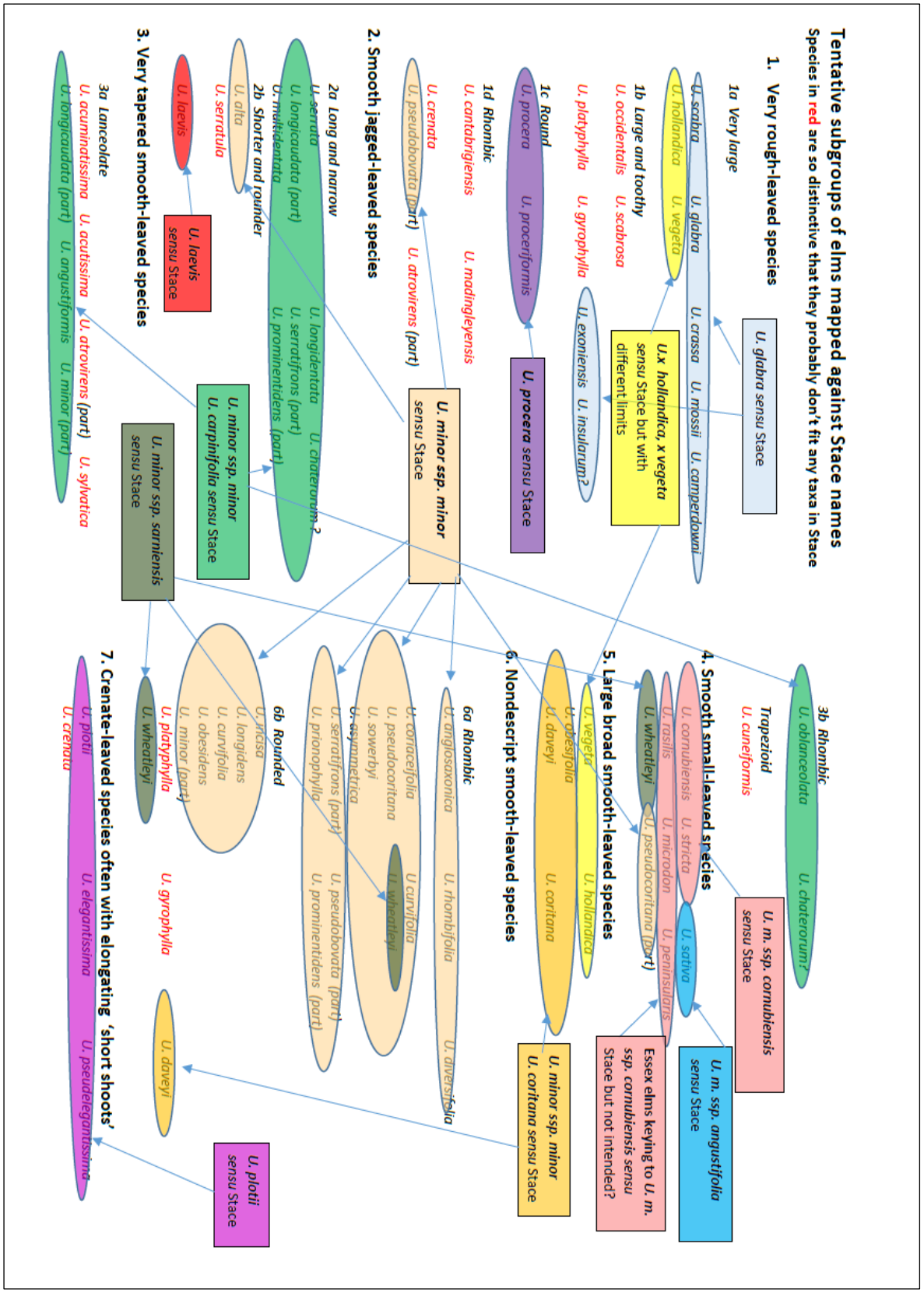
Tentative subgroups of elms similar in leaf shape and texture, colour coded to taxa used in Stace (2019).



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Tabulation of key features of species

Flora number	Scientific name	Rough	Smooth	Leaf length min	Leaf length max	Leaf breadth min	Leaf breadth max	L-B ratio min	L-B ratio max	Veins min	Veins max	Asymmetry min	Asymmetry max	Petiole min	Petiole max
	ROUGH														
40	*procera* rough	1		6	9	4	7	1.2	1.6	10	16	3	7	5	8
41	*proceriformis** rough	1		5	8	3	6	1.1	1.6	10	13	1	4	3	7
42	*atrovirens* rough	1		6	9	3	5	1.7	2	12	16	2	6	9	11
43	*crenata*	1		5	10	3	6	1.5	2	11	19	1	6	7	10
44	*madingleyensis*	1		5	11	3	6	1.5	2	13	20	2	7	5	12
45	*pseudobovata*	1		5	7	3	4	1.6	2	11	20	2	8	3	9
46	*obesifolia* rough	1		5	9	3	5	1.2	1.9	14	21	2	9	4	9
47	*crassa*	1		8	12	3	6	1.8	2.6	21	24	4	7	6	9
48	*cantabrigiensis*	1		6	10	4	6	1.5	2	12	17	1	4	6	11
50	*mossii*	1		10	15	6	9	1.5	2	16	26	2	8	3	7
51	*occidentalis*	1		6	11	4	7	1.4	1.7	11	20	2	8	3	9
53	*vegeta* rough	1		8	16	5	9	1.5	2	12	22	6	18	9	16
54	*platyphylla*	1		7	13	5	8	1.2	1.6(-1.8)	9	16	2	9	6	11
55	*exoniensis*	1		8	11	6	8	1.3	1.5	17	19	7	9	5	10
56	*gyrophylla*	1		7	12	4	7	1.2	1.8	15	19	4	8	5	11
57	*scabrosa*	1		7	12	4	7	1.5	2	10	20	4	8	6	8
59	*hollandica* rough	1		7	14	4	8	1.5	1.8	13	21	4	13	6	13
60	*scabra*	1		8	17	4	11	1.6	2.2	16	26	2	8	3	7
61	*glabra*	1		10	18	4	9	2	3	17	27	3	13	3	6
62	*camperdownii**	1		14	18	8	11	1.6	1.8	18	25	11	14	8	8
	SMOOTH														
1	*cornubiensis*		1	2	4	1.5	2	1.5	2	9	12	0	2	1.5	6
2	*stricta*		1	5	7	3	4	1.5	2.2	11	16	0.5	3	5	8
3	*sativa*		1	3	6	2	4	1.5	2	9	15	1	4	4	11
4	*wheatleyi*		1	5	7	3	5	1.2	1.7	11	17	2	8	6	11
5	*curvifolia*		1	5	7	2	4	1.5	2.2	12	19	0	4	5	10
6	*anglosaxonica*		1	4	7	2	4	1.5	2	11	15	1	4	4	9
7	*angustiformis*		1	4	7	2	3	2	2.7	13	18	1	4	7	9
8	*rasilis*		1	3	5	2	3	1.6	1.9	9	13	0	4	4	8
9	*microdon*		1	5	7	3	4	1.5	2	12	17	1	6	6	12

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Tabulation of key features of species (continued)

Flora number	Scientific name	Rough	Smooth	Leaf length min	Leaf length max	Leaf breadth min	Leaf breadth max	L-B ratio min	L-B ratio max	Veins min	Veins max	Asymmetry min	Asymmetry max	Petiole min	Petiole max
	SMOOTH														
10	*minor*		1	5	10	3	5	1.7	2.5	10	21	2	10	7	14
11	*plotii*		1	4	6	2	4	1.3	2.3	8	14	4	10	1	6
12	*serrata*		1	4	7	2	4	1.4	2	10	16	1	4	5	9
13	*prominentidens*		1	5	8	3	4	1.5	2	12	18	3	8	5	10
14	*pseudocoritana*		1	5	8	4	5	1.4	2	12	17	3	8	5	10
15	*acutissima*		1	6	10	3	6	2	2.5	15	19	3	8	8	13
16	*longidentata*		1	6	9	3	5	1.7	2	13	22	2	6	6	10
17	*sylvatica*		1	6	10	3	4	1.7	2.7	13	22	2	9	7	11
18	*serratifrons*		1	6	10	3	5	1.4	2.3	13	20	3	8	9	14
19	*obesidens*		1	6	9	4	6	1.4	1.8	15	20	5	8	6	9
20	*longidens**		1	5	7	3	4	1.5	2	12	17	2	5	7	10
21	*coriaceifolia*		1	5	7	3	4	1.7	2.2	12	17	2	6	7	10
22	*laevis**		1	4	12	3	6	1.6*	2.1*	17	21	3	12	5	7
23	*cuneiformis*		1	8	11	3	5	2	2.5	16	20	3	9	7	14
24	*peninsularis*		1	5	8	3	4	1.5	2.3	12	17	3	8	6	10
25	*rhombifolia*		1	5	9	3	6	1.3	1.9	9	17	1	6	7	11
26	*multidentata*		1	5	8	3	5	1.8	2	12	17	2	6	8	12
27	*pseudelegantissima*		1	4	7	3	4	1.5	2	9	12	2	4	4	9
28	*diversifolia*		1	4	7	3	4	1.3	2.1	11	16	1	5	4	9
29	*longicaudata*		1	6	10	3	5	1.5	2.3	13	22	3	7	5	9
30	*chaterorum*		1	6	10	3	5	1.8	2.5	13	16	2	5	4	8
31	*elegantissima*		1	5	7	3	5	1.7	2	8	12	2	6	5	10
32	*incisa*		1	5	8	3	6	1.6	2	14	17	2	5	7	10
33	*alta*		1	5	9	3	7	1.5	2	11	16	3.3	8.1	7	11
34	*oblanceolata*		1	5	10	3	5	1.7	2.3	11	20	2	8	6	13
35	*serratula*		1	6	9	4	5	1.6	2.1	13	16	4	8	9	13
36	*acuminatissima*		1	5	9	3	5	1.5	2	15	18	2.5	9	7	11
37	*sowerbyi*		1	6	8	3	4	1.8	2.1	13	16	3	8	9	14
38	*asymmetrica*		1	5	8	3	5	1.5	2	14	17	5	15	10	20
39	*coritana*		1	5	10	3	6	1.5	2	12	17	4	11	8.5	12
40	*procera* smooth		1	6	9	4	7	1.2	1.6	10	16	3	7	5	8
41	*proceriformis** smooth		1	5	8	3	6	1.1	1.6	10	13	1	4	3	7
42	*atrovirens* smooth		1	6	9	3	5	1.7	2	12	16	2	6	9	11
46	*obesifolia* smooth		1	5	9	3	5	1.2	1.9	14	21	2	9	4	9
49	*prionophylla*		1	6	9	3	5	1.6	2.4	13	21	2	6	6	9
52	*daveyi*		1	5	10	5	7	1.5	1.7	15	22	6	9	6	10
53	*vegeta* smooth		1	8	16	5	9	1.5	2	12	22	6	18	9	16
58	*insularum**		1	6.5	8.5	4.5	6.0							8	12
59	*hollandica* smooth		1	7	14	4	8	1.5	1.8	13	21	4	13	6	13

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Part 2: Descriptions and illustrations

v. 3.0 **July 2025**

The following pages illustrate most of the British elms, and provide short descriptions of each, with notes on the species with which they are most likely to be confused, and a summary of their known range.

Where a similarity is striking, I have compared elm species with other trees and shrubs: *U. sylvatica* like a broad-leaved willow, *U, microdon* like crab-apple, if users notice other similarities, I would be very glad to hear from them, as I think this may help people remember the differences.

The description follows a standard format:

> **Sell & Murrell number, Scientific name, English name**
>
> Group similarities. Overall appearance, especially leaf shape, contrasted with similar species, referenced to the broad groupings in the diagram on page 58.
>
> Summary of measurements:
>
> Leaf length, leaf breadth, length-breadth ratio, number of veins on longer side, blade asymmetry, petiole length.
>
> Similar species
>
> Distribution as currently known.

Some species are so distinctive that they can be recognised by comparison with the photos and descriptions. Others form easily-recognised small groups within which the species are rather similar. And there are about 20 ‘nondescript smooth-leaved elms’ which have lanceolate-rhombic leaves and are rather difficult to tell apart. I’ve indicated to which group each species belongs.

At this stage, I’ve tried to include a photo of each species’ foliage alive in the field, and part of a herbarium sheet. In future I hope to add close-ups of the teeth on the leaves, and a typical leaf-base, petiole and buds, all of which are rather distinctive in most species.

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1 Ulmus cornubiensis **Cornish Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, of which this is the smallest-leaved species, with neatly obovate leaves (some widest in middle, some in upper half) up to twice as long as wide, and medium-size regular teeth, barely asymmetrical at the base, fairly short-stalked: rather crab-apple-like.

Leaves 2-4 x 1.5-2cm, 1.5-2x as long as broad, 9-12 veins on longer side, 0-2mm asymmetrical, 1.5-6mm petiole.

Similar species: *2 stricta, 3 sativa, 4 wheatleyi, 8 rasilis, 9 microdon, 14 pseudocoritana, 24 peninsularis.* Very close to *2 stricta,* which also occurs in the southwest, but has slightly larger leaves.

By roads, around farms and in hedges, frequent in south-west Cornwall, and scattered across the rest of Cornwall and Devon.

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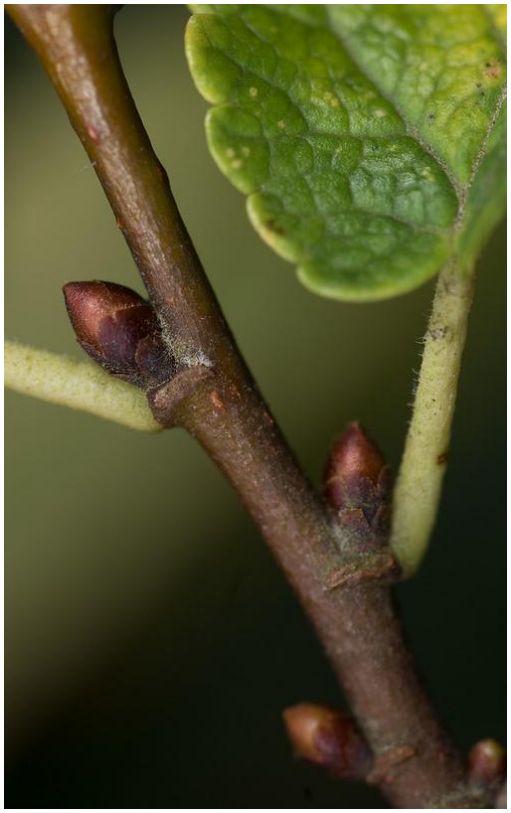

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2 ***Ulmus stricta* Small-leaved Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, very similar to *U. cornubiensis,* but slightly larger leaves, some of which are up to 7cm long and 2.2 times as long as wide, neatly obovate-lanceolate leaves (most leaves widest above middle) and quite fine regular teeth in upper half. Barely asymmetrical, rather longer stalks than in *U. cornubiensis.*

Leaves 5-7 x 3-4cm, 1.5-2.2x as long as broad, 11-16 veins on longer side, 0.5-3mm asymmetrical, 5-8mm petiole.

Similar species: *1 cornubiensis, 3 sativa, 4 wheatleyi, 8 rasilis, 9 microdon, 14 pseudocoritana, 24 peninsularis*

Common throughout Cornwall and Devon, extending into Somerset and Dorset, with scattered records in Sussex. Middlesex and Bucks.

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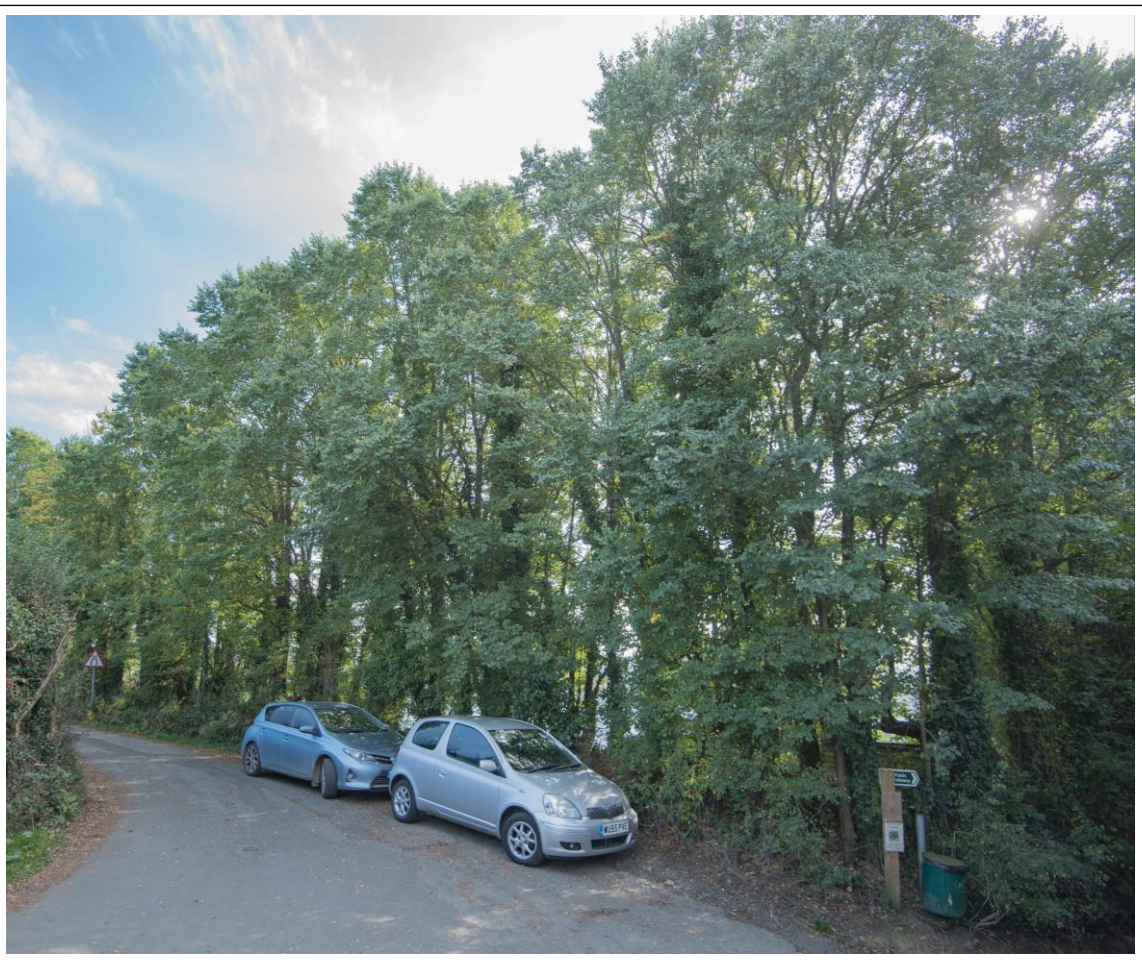

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3 ***Ulmus sativa* Goodyer's Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, not unlike *U. cornubiensis* and *U. stricta,* but slightly larger, broader leaves, to 2.2 times as long as wide, neatly ovate-lanceolate leaves and quite fine regular teeth in upper half. Barely asymmetrical,. Barely asymmetrical, and with longer stalks than in *U. stricta,* up to 11mm.

Leaves 3-6 x 2-4cm, 1.5-2x as long as broad, 9-15 veins on longer side, 1-4mm asymmetrical, 4-11mm petiole.

Similar species: *1 cornubiensis, 2 stricta, 4 wheatleyi, 8 rasilis, 9 microdon, 14 pseudocoritana, 24 peninsularis*

Apparently confined to south-west Hampshire and east Dorset.

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***4 Ulmus wheatleyi* Jersey Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, in this case, with rather broad rounded leaves and neat, rather square, blunt teeth. Quite asymmetrical, with rounded bulge on the longer side, and quite long-stalked.

Leaves 5-7 x 3-5cm, 1.2-1.7x as long as broad, 11-17 veins on longer side, 2-8mm asymmetrical, 6-11mm petiole.

Similar species: *1 cornubiensis, 2 stricta, 3 sativa, 8 rasilis, 9 microdon, 14 pseudocoritana, 24 peninsularis*

Apparently common in the Channel Islands, scattered in southern England and occasionally planted elsewhere. Formerly popular as a street tree because of its regular, neatly conical growth form.

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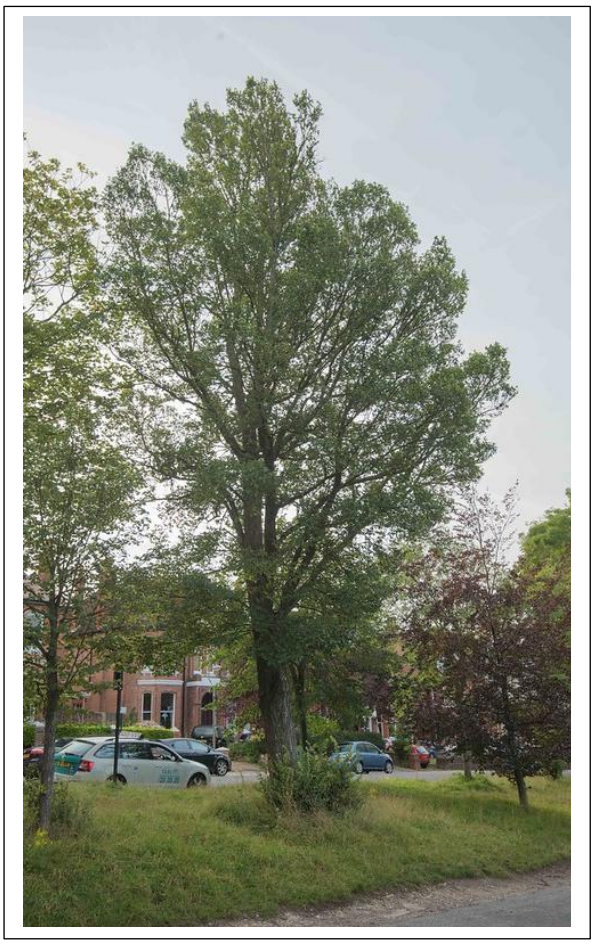

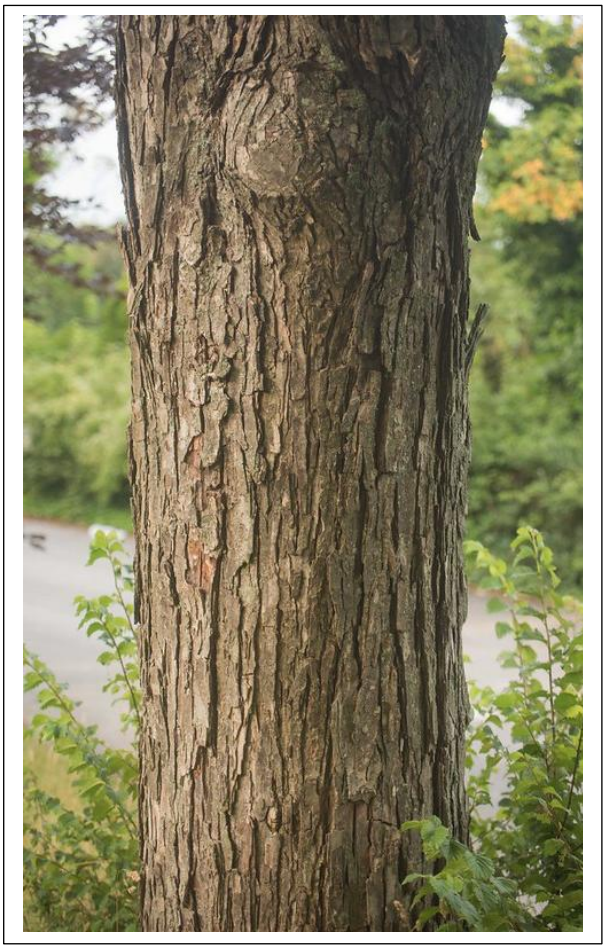

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***5 Ulmus curvifolia* Curved-leaved Elm:** One of the group of about 20 smooth-leaved elms with fairly nondescript lanceolate-rhombic leaves, but small-leaved enough to be confused with some of that group too. A fairly small-leaved very smooth-leaved elm, with neatly ovate-lanceolate leaves and fine regular teeth in upper half. Barely asymmetrical, quite long-stalked.

Leaves 5-7 x 2-4cm, 1.9-2.2x as long as broad, 12-19 veins on longer side, 0-4mm asymmetrical, 5-10mm petiole.

Similar species: many, but especially *8 rasilis, 24 peninsularis, 18 serratifrons, 21 coriaceifolia, 32 incisa, 33 alta, 34 oblanceolata.*

Roadsides in north Herts, Cambs and Essex.

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***6 Ulmus anglosaxonica* Anglo-Saxon Elm:** one of the ten or so smooth-leaved elms with jagged, rhombic-rounded leaves. A fairly small-leaved elm, with neatly rhomboid leaves and prominent regular triangular teeth in upper half. Not very asymmetrical, quite long-stalked.

Leaves 4-7 x 2-4cm, 1.5-2x as long as broad, 11-15 veins on longer side, 1-4mm asymmetrical, 4-8mm petiole.

Similar species: very close to *16 longidentata* and *28 diversifolia,* and also confusable with *13 prominentidens, 18 serratifrons, 25 rhombifolia, 33 alta, 49 prionophylla.*

Common near the coast in Norfolk and Suffolk, less frequent inland, and a handful of Cambs records.

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7 Ulmus angustiformis **Luffenham Elm:** one of a group of eight or so very tapered lanceolate-leaved smooth-leaved elms, this is the most narrowly-elliptical of the British species, almost symmetrical at the base, with quite small, neat teeth and conspicuous triangles of white or fawn felty hairs in the axils of the veins on the underside. Welsh populations (opposite page and top right, below) have narrower, more asymmetrical leaves and finer, less jagged teeth.

Leaves 4-7 x 2-3cm, 2-2.7x as long as broad, 13-18 veins on longer side, 1-4mm asymmetrical, 7-9mm petiole.

Could be confused with *10 minor, 29 longicaudata, 30 chaterorum, 34 oblanceolata* and the planted *davidiana x pumila* 'Sapporo Autumn Gold'.

Currently known from 3-4 regrowing stumps at South Luffenham, Leics, and 15 trees in two woods near the coast of Ceredigion.

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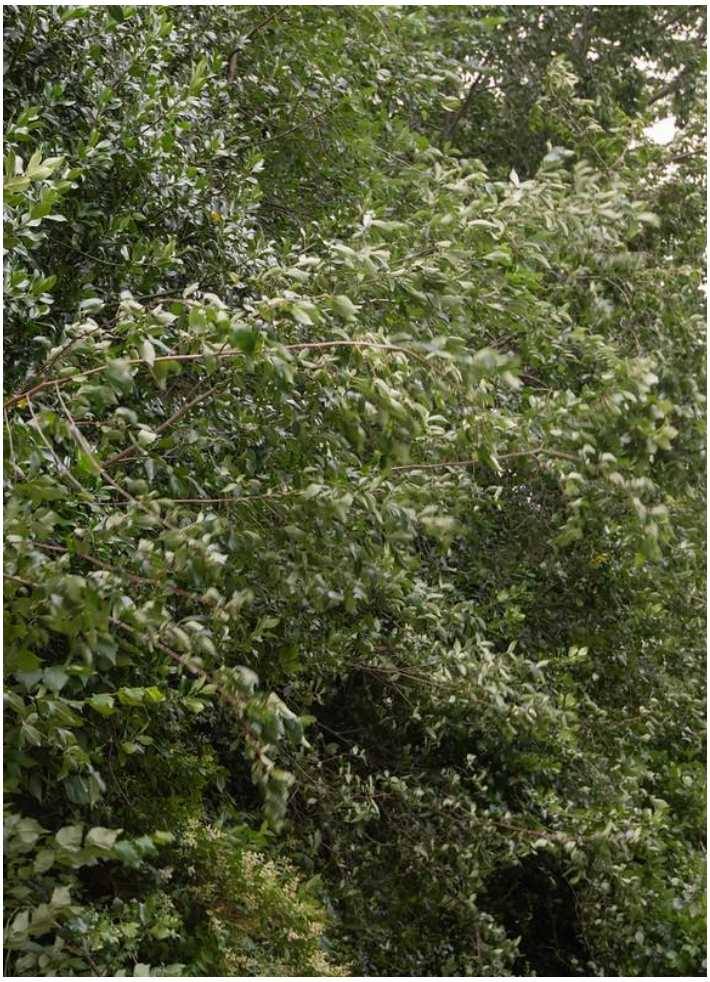

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8 Ulmus rasilis **Smooth-leaved Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, this has neatly ovate leaves less than twice as long as wide, with fairly large regular teeth, definitely acute rather than acuminate and slightly asymmetrical at the base, medium-stalked..

Leaves 3-5 x 1.5-2cm, 1.6-1.9x as long as broad, 9-13 veins on longer side, 0-4mm asymmetrical, 4-8mm petiole.

Similar species: *1 cornubiensis, 2 stricta, 3 sativa, 4 wheatleyi, 9 microdon, 14 pseudocoritana, 24 peninsularis* and small-leaved examples of the 'nondescript' smooth-leaved elms such as *5 curvifolia*

By roads and in hedges, so far known from a few localities in north Essex.

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9 Ulmus microdon **Dwarf-leaved Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, this is a very smooth-leaved elm, with small, neat, fairly fine-toothed ovate leaves looking rather like crab-apple. Moderately asymmetrical, quite long-stalked.

Leaves 5-7 x 3-4cm, 1.5-29 as long as broad, 12-17 veins on longer side, 1-6mm asymmetrical, 6-12mm petiole.

Similar species: *1 cornubiensis, 2 stricta, 3 sativa, 4 wheatleyi, 14 pseudocoritana, 24 peninsularis* and small-leaved examples of the 'nondescript' smooth-leaved elms such as *5 curvifolia*

Scattered throughout Essex, commonest in the south, extending into Cambs and Herts.

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***10 Ulmus minor* Cambridge Elm:** Beware! The name *Ulmus minor* has often been used for all the smooth-leaved elms together, so many records do not refer to this species. It fits among the very tapered and the nondescript smooth-leaved species, as it has fairly long, narrow-lanceolate medium-sized smooth leaves, some 2.5x as long as wide, with teeth fairly regular within a leaf, but variable between, and a long, tapered point. Variably asymmetrical and relatively long-stalked.

Leaves 5-10 x 3-5cm, 1.7-2.5x as long as broad, 10-21 veins on longer side, 2-10mm asymmetrical, 7-14mm petiole.

Similar species: many, but especially *5 curvifolia, 18 serratifrons, 21 coriaceifolia, 29 longicaudata, 33 alta, 34 oblanceolata.*

Considered by Sell to be the commonest elm in Cambridgeshire, especially along the valley of the R Cam, and also common in Hunts, and extending into Beds, Leics and Northants.

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***11 Ulmus plotii* Plot's Elm:** one of the three crenate-toothed elms with elongating 'short' shoots, this has a very distinctive growth-form, narrow and with pendulous branches and a floppy one-sided top. It has small leaves which are eventually smooth, with rounded teeth (crenate rather than serrate).

Leaves 4-6 x 2-4cm, 1.3-2.3x as long as broad, 8-14 veins on longer side, 4-10mm asymmetrical, 1-6mm petiole.

Similar species: in growth form, completely distinctive. From foliage, rather close to *27 pseudelegantissima* and *31 elegantissima* and may be mistaken for some forms of *15 acutissima,* or *42 atrovirens.*

Roadsides, stream banks, hedges and field margins, mainly in an area from the Trent Valley and the Fens to the Chilterns, Marlborough downs and Mid Wales.

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12 Ulmus serrata **Assington Elm** A uniquely jagged smooth-leaved elm with broad rhombic leaves and proportionately the longest teeth of any British elm, the tips of which are often paler, yellowish. Reminiscent of Small Nettle *Urtica urens* leaves. Moderately asymmetrical and quite long-stalked.

Leaves 4-7 x 2-4cm, 1.4-2x as long as broad, 10-16 veins on longer side, 1-4mm asymmetrical, 5-9mm petiole.

No very similar species: rather like a very sxtreme version of *6 anglosaxonica, 16 longidentata, 25 rhombifolia, 28 diversifolia*.

As far as is known, confined to roadsides, copses and hedgerows around the village of Assington

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13 Ulmus prominentidens **Prominent-toothed Elm** one of the jagged round-rhombic smooth-leaved elms. Leaves neatly diamond-shaped, often rather curved, the upper 60-70% of each of the upper leaves on short shoots usually have conspicuous jagged teeth, the lower portion almost straight-sided. Lower leaves are often small- and blunt-toothed or even crenate. Leaf apex drawn out and pointed. Fairly large round-bulging asymmetry and medium petiole.

Leaves 5-8 x 3-4cm, 1.5-2x as long as broad, 12-18 veins on longer side, -8mm asymmetrical, 5-10mm petiole.

Similar species: most likely to be confused with *16 longidentata* (jagged teeth extend almost to base), *6 anglosaxonica, 28 diversifolia.*

Hedgerows and riverside, so far known from scattered sites in Suffolk and Cambridgeshire.

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14 Ulmus pseudocoritana **Round-leaved Elm:** A difficult species to place. Some trees are small-leaved and resemble *4 wheatleyi* or *9 microdon;* others are larger-leaved and fairly nondescript rhombic. Most leaves are fairly broad, noticeably oblanceolate or obovate, with a few fairly large sometimes irregular teeth around the 'shoulders' but much smaller teeth in the basal half. Quite strongly asymmetrical with a well-rounded lobe, and medium petioles.

Leaves 5-8 x 4-5cm, 1.4-2x as long as broad, 12-17 veins on longer side, 3-8mm asymmetrical, 5-10mm petiole.

Similar species: may be confused either with *3 sativa, 4 wheatleyi, 8 rasilis, 9 microdon, 24 peninsularis,* or with the smaller-leaved rhombic species (many of which however, are much less asymmetrical), such as *5 curvifolia, 13 prominentidens, 20 longidens, 21 coriaceifolia..*

Roadsides, hedges and field margins: widespread in Norfolk and Suffolk, extending int Berks, Cambs, Nprthants., Leics. and Salop.

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15 Ulmus acutissima **Bonhunt Elm:** one of the few elm species with rounded crenate teeth. Smooth leaves are clearly broadest in the basal half, tapering neatly to an acute point, leaves, a medium well-rounded asymmetry and rather long thin petioles. Dark green above contrasts with a very pale lower surface. Veins rather deep, teeth often crimped (apical edge of each tooth upturned slightly).

Leaves 6-10 x 3-4cm, 2-2.5x as long as broad, 15-19 veins on longer side, 3-8mm asymmetrical, 8-13mm petiole.

Similar species: quite a distinctive species. Most similar are the crenate-leaved *11 plotii, 27 pseudelegantissima* and *31 elegantissima,* which have elongating 'short shoots' and leaves widest near the middle. In leaf shape rather like *42 atrovirens,* with more pointed teeth. *43 U. crenata* usually has larger leaves, broadest around the middle, but its smaller leaves are rather like *15 acutissima.*

Currently known only from roadside and hedges in the Wicken Bonhunt area of north Essex, and a roadside tree and suckers near Bartlow, Cambs.

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16 Ulmus longidentata **Jagged-leaved Elm** one of the smooth, jagged-leaved elms, either lanceolate or rhombic, with prominent triangular teeth around most of the leaf, getting much smaller in the basal 20%. Quite symmetrical or with a slight bulge, and long-petioled.

Leaves 6-9 x 3-5cm, 1.7-2x as long as broad, 13-22 veins on longer side, 2-6mm asymmetrical, 6-10mm petiole.

Similar species: like a larger longer-leaved *6 anglosaxonica* or a less asymmetrical *13 prominentidens.* Might also be confused with *18 serratifrons, 26 multidentata, 29 longicaudata,* or a small-leaved *prionophylla.*

Roadsides, hedges, copses and field margins, mainly in Huntingdonshire, also extending into Cambs fenland.

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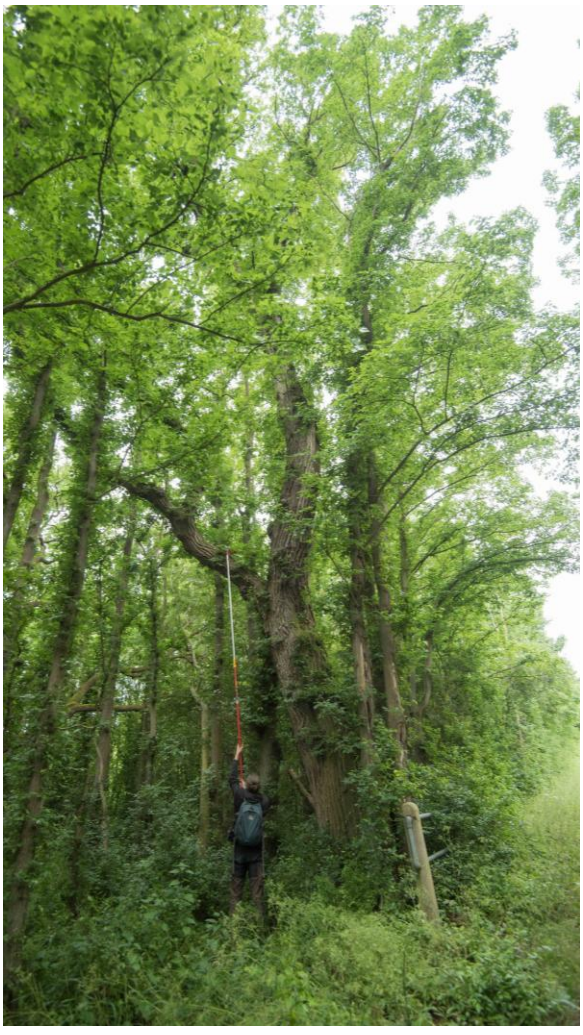

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17 Ulmus sylvatica **Hatley Elm** A very striking smooth-leaved elm with strongly tapered, rather curved, neatly-toothed dark green mature leaves rather resembling a broad-leaved white willow *Salix alba* (without the hairs). Quite strongly asymmetrical and moderately long petiole.

Leaves 6-10 x 3-4cm, 1.7-2.7x as long as broad, 13-22 veins on longer side, 2-9mm asymmetrical, 7-11mm petiole.

Similar species: quite characteristic, but from shape and measurements would be closest to *7 angustiformis, 10 minor, 29 longicaudata, 30 chaterorum, 34 oblanceolata.*

Currently known only from a few ancient woodlands on boulder clay, and a fen drove, in Cambridgeshire.

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18 Ulmus serratifrons **Burred Elm**: part of the group of 20 or so smooth-leaved, nondescript rhombic species, a medium-leaved smooth-leaved elm, with broadly lanceolate to rhombic leaves with quite small but rather jagged teeth in the upper half, and a long-acuminate apex. The trunks often have large, dark, rough-barked bosses or burrs, sometimes with tufts of epicormic shoots, from quite a young age.

Leaves 6-10 x 3-4cm, 1.4-2.3x as long as broad, 13-20 veins on longer side, 3-8mm asymmetrical, 9-14mm petiole.

Similar species: the burrs on the bark are an unusual feature. Otherwise it is quite similar to many of the lanceolate-rhombic species: *5, curvifolia, 10 minor, 20 longidens, 21 coriaceifolia, 32 incisa, 33 alta, 34 oblanceolata, 37 sowerbyi, 45 pseudobovata.*

By tracks, field margins, ditches and roads, and in hedges, copses and parks. Widespread in Cambs, Beds and especially Hunts, extending into Northants.

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19 Ulmus obesidens **Fat-toothed Elm** One of the 20 or so nondescript smooth-leaved species with rounded leaves. This has unusually shallow but broad-based teeth, the primary teeth often obtuse or slightly cuspidate. Leaves fairly asymmetrical, with a broadly rounded lobe on the long side, and short-medium petioles.

Leaves 6-9 x 4-6cm, 1.4-1.8x as long as broad, 15-20 veins on longer side, 5-8(-14)mm asymmetrical, 6-9mm petiole.

Similar species: *20 longidens, 25 rhombifolia, 32 incisa,, 37 sowerbyi, 45 pseudobovata* or perhaps a small-leaved *52 daveyi* or a rather pointed-toothed *39 coritana.*

Roadsides and hedges on Cambs-Essex border and at one site in Beds.

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20 Ulmus longidens **Long-toothed leaved Elm** One of the 20 or so nondescript smooth-leaved species with rounded leaves. Despite the name, its teeth are not particularly long, but they do curve strongly toward the apex of the leaf, rather like *U. laevis* but less finely pointed. Fairly short asymmetry and medium petioles.

Leaves 5-7 x 3-4cm, 1.5-2x as long as broad, 12-17 veins on longer side, 2-5mm asymmetrical, 7-10mm petiole.

Similar species: *19 obesidens, 25 rhombifolia, 32 incisa,, 37 sowerbyi, 45 pseudobovata* or perhaps a small-leaved *52 daveyi* or a rather pointed-toothed *39 coritana.*

Currently known from a few sites in south Essex south and east of Chelmsford, and a few woodlands in Ceredigion.

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21 Ulmus coriaceifolia **Leathery-leaved Elm** One of the 20 or so nondescript smooth-leaved species, in this case with rather rhombic-lanceolate leaves. Rather lacking in distinctive features, it has fairly symmetrical leaves with little bulging at the base, medium-long petioles, and rather irregular teeth with quite wide sinuses like *32 incisa.* Leaf outline quite variable, some growth much longer and narrower than others. Rather short acuminate or cuspidate; a tendency to broad 'shoulders' on leave on long shoots.

Leaves 5-7 x 3-4cm, 1.7-2.2x as long as broad, 12-17 veins on longer side, 2-6mm asymmetrical, 7-10mm petiole.

Similar species: in addition to the 'nondescript' group, especially *19 obesidens, 25 rhombifolia, 32 incisa,, 37 sowerbyi, 45 pseudobovata,* also similar to some small-leaves species such as *8 rasilis, 14 pseudocoritana, 24 peninsularis.*

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22 Ulmus laevis **European White Elm** Distinctive, not close to other European elms. The long stalks of the dangling flowers/fruits (persisting as tufts of blackish 'wires') rule out all others except the rarely-planted American White Elm, *U. americana,* which has more elongate leaves. The fruits are hairier than any native elm. Leaf shape would be round-rhomboid jagged-leaved or nondescript, but the teeth are more finely pointed than any other species, and curve strongly toward the leaf apex. Leaf shape seems variable, from a large bulging asymmetry resembling *53 vegeta* or *59 hollandica* but the straight or concave short side is distinctive, looking rather like a cutaway guitar, to almost symmetrical with no bulge.

Leaves 4-12 x 3-6cm, 1.6-2.1 x as long as broad, 17-21 veins on longer side, 3-7(-12)mm (S&M; my samples 9-17mm) asymmetrical, petiole up to 5(-7)mm (S&M; my samples 6-11mm).

Similar species: not close to other species, might be mistaken for *53 vegeta* or *59 hollandica* or *25* rhombifolia, but very different in many respects.

Introduced. Rarely planted as a street or parkland tree or within woodland (Northants, Ceredigion). Can self-seed. May be planted more frequently as it is rarely infected by Dutch Elm

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23 Ulmus cuneiformis **Wedge-leaved Elm:** a stand-alone smooth-leaved species with long, trapezoidal leaves. Well developed leaves on short shoots generally dark green, long-tapered from the base, with high 'shoulders', roughly parallelogram-shaped and with an almost right-angled lobe on the long side, often with rather uneven and jagged teeth in the apical third. Quite a large asymmetry and long petioles. Often with long, thin upward-curving lower twigs

Leaves 8-11 x 3-5cm, 2-2.5x as long as broad, 17-21 veins on longer side, 3-9mm asymmetrical, 7-14mm petiole.

Similar species: distinctive; might be confused with *10 minor, 29 longicaudata, 34 oblanceolata.*

Roadsides, hedges and stream banks, Suffolk, Cambs, Beds, Hunts, Northants and outliers in Cards and Herefs.

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***24 Ulmus peninsularis* Peninsular Elm:** One of the group of about 8 small-leaved, smooth-leaved elms, with small-medium, neat, fairly regularly-toothed ovate leaves looking rather like crab-apple. Moderately asymmetrical, with a fairly substantial bulge on the longer side and a smaller one on the shorter, so the less asymmetrical leaves can look cordate. Quite long-stalked.

Leaves 5-8 x 3-4cm, 1.5-2.3x as long as broad, 12-17 veins on longer side, 3-8mm asymmetrical, 6-10mm petiole.

Similar species: *1 cornubiensis,2 stricta, 3 sativa, 4 wheatleyi, 14 pseudocoritana* and small-leaved examples of the 'nondescript' smooth-leaved elms such as *5 curvifolia.*

Mainly known from hedgerows and roadsides on the Dengie peninsula in south Essex, also found at a site in Bedfordshire, so probably more widespread.

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25 Ulmus rhombifolia **Rhombic-leaved Elm:** part of the group of 20 or so smooth-leaved, nondescript rhombic species, a medium-sized smooth-leaved elm, with rhombic to rounded leaves with rather jagged teeth in the upper half curved slightly toward the apex, and rather regular shallow teeth in the basal half. Shortly acuminate or cuspidate at apex. Almost symmetrical to slightly asymmetrical with a narrow bulge on the long side, and with quite long petioles.

Leaves 5-9 x 3-6cm, 1.3-1.9x as long as broad, 9-17 veins on longer side, -6mm asymmetrical, 7-11mm petiole.

Similar species: in addition to the 'nondescript' group, especially *19 obesidens, 21 coriaceifolia, 32 incisa,, 37 sowerbyi, 45 pseudobovata,* also similar to some small-leaves species such as *8 rasilis, 14 pseudocoritana, 24 peninsularis.*

Hedges, woodland, scattered in Essex and Herts, with a few records from Hunts and Northants.

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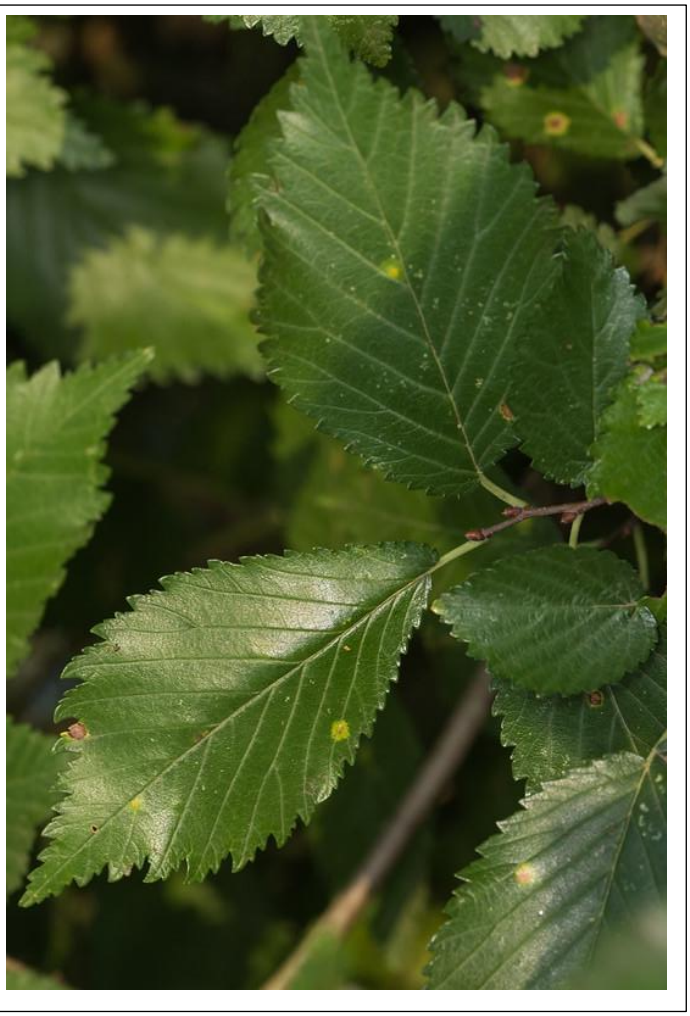

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26 Ulmus multidentata **Narrow-crowned Elm:** one of the smooth, jagged-leaved elms, lanceolate, with quite prominent broadly triangular teeth around most of the leaf. Small to moderate asymmetry, with a broad bulge on the long side and gently convex on the short side; and variable petiole length.

Leaves 5-8 x 3-5cm, 1.8-2(-2.2)x as long as broad, 12-17 veins on longer side, 2-6(-8)mm asymmetrical, (5-)8-12mm petiole.

Similar species: close to *29 longicaudata* but generally less asymmetrical, with less acute teeth and generally a convex base on the short site. Also similar to *13 prominentidens, 18 serratifrons,* or a small-leaved *49 prionophylla.*

Hedges and copses, north Essex and west Suffolk.

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27 Ulmus pseudelegantissima **Essex Elm:** a medium-leaved smooth-leaved elm, with the same continuous-growing 'short' shoots and crenate leaves as *11 U. plotii.* Rather larger leaves, less asymmetrical, and with longer petioles than plotii. Mature trees (rare at present) are narrowly domed or columnar without the floppy top of *11 plotii.*

Leaves 4-7 x 3-4cm, 1.5-2x as long as broad, 9-12 veins on longer side, 2-4mm asymmetrical, 4-9mm petiole.

Similar species: from foliage, rather close to *11 plotii* and *31 elegantissima* (see Note at end of keys) and may be mistaken for some forms of *15 acutissima,* or *42 atrovirens.*

Roadsides, hedges and field margins, frequent in north Essex, especially near Waltham Cross. Outlying records from Suffolk.

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28 Ulmus diversifolia **East Anglian Elm:** one of the ten or so smooth-leaved elms with jagged, rhombic-rounded leaves. A fairly small-leaved elm, with neatly rhomboid leaves and prominent regular triangular teeth in upper half. Not very asymmetrical, quite long-stalked.

Leaves 4-7 x 3-4cm, 1.3-2.1x as long as broad, 11-16 veins on longer side, 1-5mm asymmetrical, 4-9mm petiole.

Similar species: close to *6 anglosaxonica* and quite similar to a broad-leaved *16 longidentata.* Confusable with *13 prominentidens, 18 serratifrons, 25 rhombifolia, 33 alta, 49 prionophylla.*

Widespread in Norfolk, Suffolk, Essex and Herts, occasional in Cambs.

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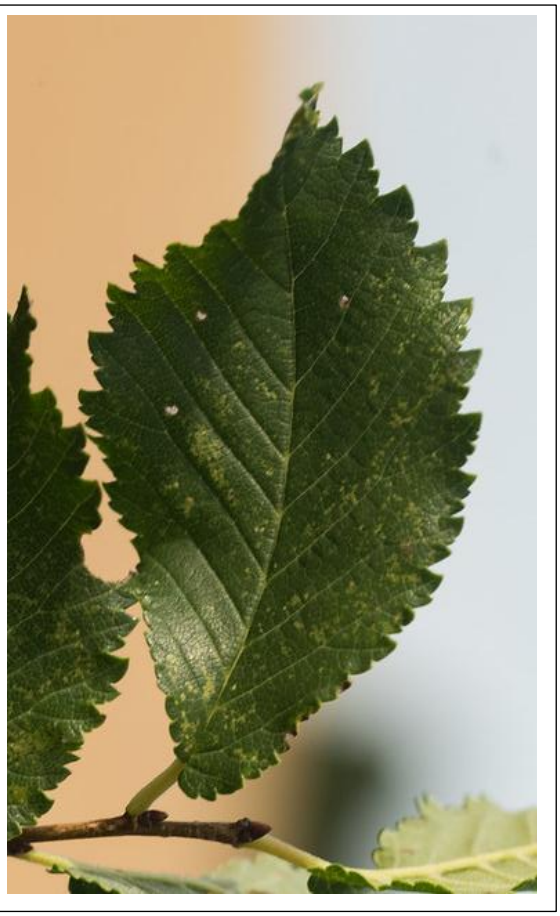

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***29 Ulmus longicaudata* Long-tailed Elm:** . one of the 7 smooth, jagged-leaved elms, lanceolate, and long-acuminate with quite prominent broadly triangular teeth around most of the leaf except the basal 20% of the short side. Small to moderate asymmetry, with a broad bulge on the long side and straight to concave and almost untoothed on the short side, running into the stalk; and variable petiole length.

Leaves 6-10 x 3-5cm, 1.5-2.3x as long as broad, 13-22 veins on longer side, 3-7(-10)mm asymmetrical, 5-9mm petiole.

Similar species: close to *26 multidentata* but with the concave untoothed base on the short side short site. Also similar to *13 prominentidens, 18 serratifrons, 30 chaterorum* or a small-leaved *49 prionophylla.*

Scattered in N Essex, S-E Cambs, W Suffolk and E Norfolk. 1 record Cards

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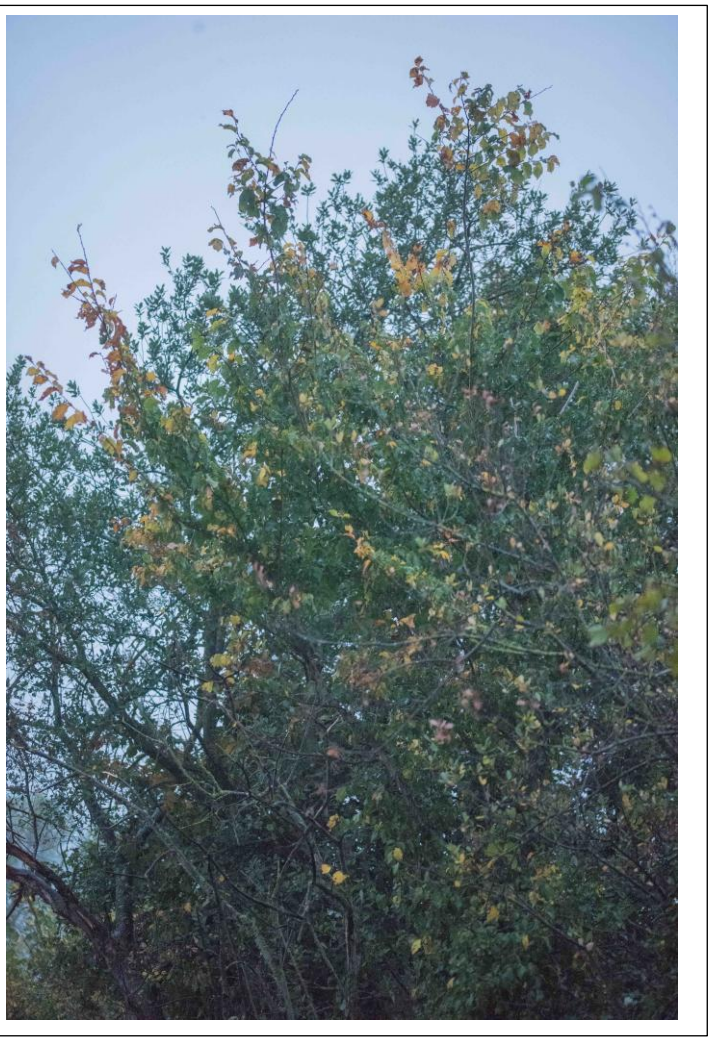

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30 Ulmus chaterorum Chaters' Elm . one of the 7 smooth, long and fairly narrow jagged-leaved elms, neatly lanceolate, and acute or shortly acuminate with medium size teeth around most of the leaf, smaller but still well developed tp the base. Short asymmetry, mostly with a well rounded bulge on the long side and gently convex on the short side, meeting the stalk at an angle or even slightly cordate; and variable petiole length.

Leaves 6-10 x 3-5cm, 1.3-1.9x as long as broad, 13-16 veins on longer side, 2-5(-7)mm asymmetrical, 4-9mm petiole.

Similar species: close to *26 multidentata* and *29 longicaudata,* but with sorter asymmetry and a convex, toothed short side at base, and less acuminate. Might also be mistaken for *13 prominentidens, 18 serratifrons,* or a small-leaved *49 prionophylla.*

Forming a small wood west of Aberaeron, Ceredigion, and possibly also in Dorset.

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31 Ulmus elegantissima Midland Elm a medium-leaved smooth-leaved elm, with the same continuous-growing 'short' shoots and crenate leaves as *U. plotii.* Larger leaves, less asymmetrical, and with longer petioles. Mature trees have a round-topped conical crown, not the slender floppy-topped like *11 plotii*.

Leaves 5-7 x 3-5cm, 173-2x as long as broad, 8-12 veins on longer side, 2-6mm asymmetrical, 5-10mm petiole.

Similar species: from foliage, rather close to *11 plotii* and *27 pseudelegantissima,* and may be mistaken for some forms of *15 acutissima,* or *42 atrovirens.*

Roadsides, hedges and field margins, frequent in Leics and Rutland, occasional in Suffolk, outliying records from Glos and Edinburgh.

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32 *Ulmus incisa* Cut-leaved Elm One of the 20 or so nondescript smooth-leaved species, in this case with rather broad-lanceolate leaves. Rather lacking in distinctive features, it has fairly symmetrical leaves with little bulging at the base, medium petioles, and rather even squarish teeth with irregular teeth with unusually wide sinuses, a feature seen in few other species, though *21 coriaceifolia* shows something similar. Leaf outline short acuminate.

Leaves 5-7 x 3-4cm, 1.7-2.2x as long as broad, 12-17 veins on longer side, 2-6mm asymmetrical, 7-10mm petiole.

Similar species: in addition to the 'nondescript' group, especially *19 obesidens, 21 coriaceifolia, 25 rhombifolia, 37 sowerbyi, 45 pseudobovata,* also similar to some small-leaves species such as *8 rasilis, 14 pseudocoritana, 24 peninsularis.*

Several mature trees in the ancient Madingley Wood, Cambs, and two trees in Leics.

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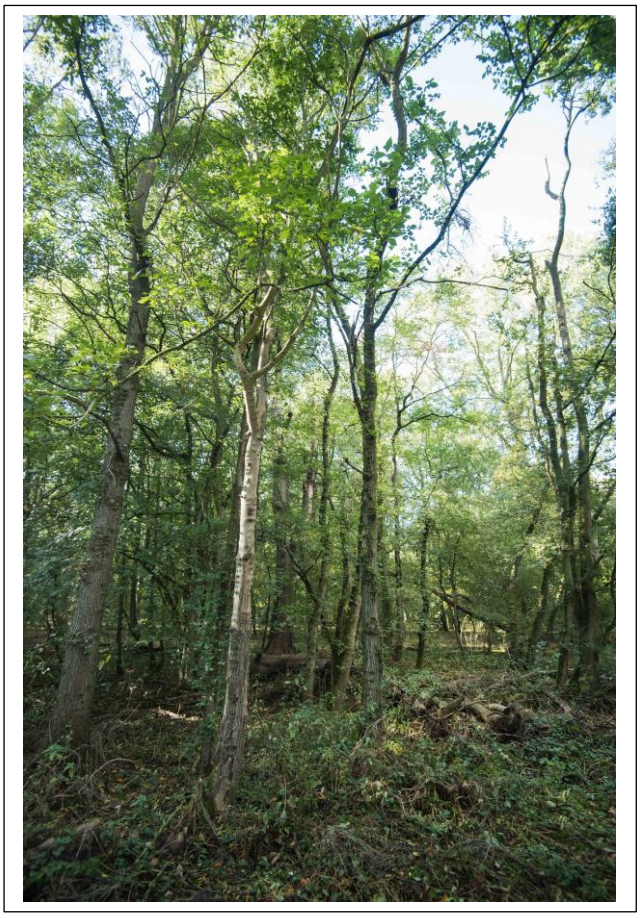

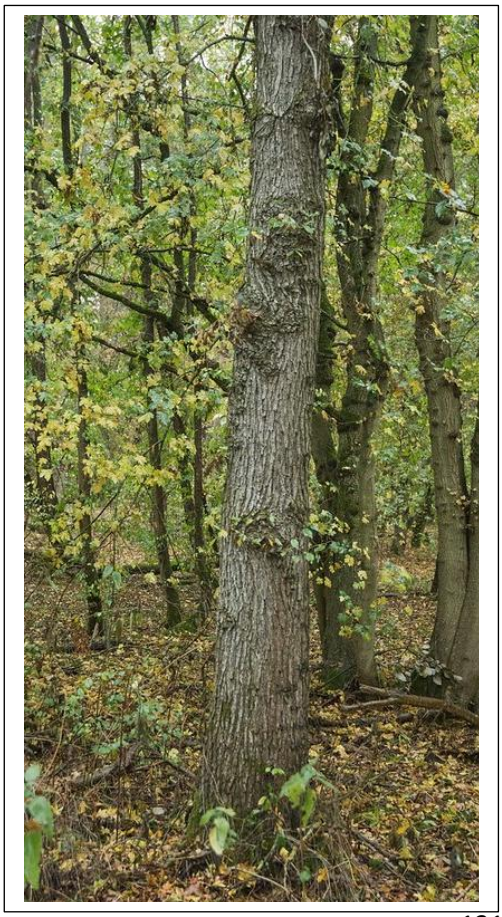

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33 *Ulmus alta* Tall Elm One of the 20 or so nondescript smooth-leaved species, in this case with rather broad-lanceolate leaves. At up to 25m tall, no taller than many smooth-leaved species. A medium-leaved smooth-leaved neatly broad-lanceolate leaves, with medium sometimes rather irregular teeth, unusual in often having an almost-parallel section for about 30% in the middle of the leaf, with an angle above and below it where the base and apex narrow. A short-medium asymmetry, with a small bulge on the long side, and the short side almost straight or just curving inward for the last 2-3mm. Petioles medium-long.

Leaves 5-9 x 3-7cm, 1.5-2x as long as broad, 11-16 veins on longer side, 3-8mm asymmetrical, 7-11mm petiole.

Similar species: in addition to the 'nondescript' group, especially *19 obesidens, 21 coriaceifolia, 25 rhombifolia, 37 sowerbyi, 45 pseudobovata,* also similar to some small-leaves species such as *8 rasilis, 14 pseudocoritana, 24 peninsularis.*

Hedgerows, stream sites and copses around Boxted and Hawkedon, west Suffolk.

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34 Ulmus oblanceolata **Narrow-leaved Elm** **S**omewhere between the very tapered group and the 20 or so nondescript smooth-leaved species, with medium- to narrowly-lanceolate leaves with a fairly long acuminate apex. Mostly oblanceolate, i.e. broadest in the upper half. Teeth rather variable, often quite small, sometimes shallow, sometimes more triangular. Fairly short asymmetry, long side contracted at base but not bulging downward much.

Leaves 5-10 x 3-5cm, 1.7-2.3x as long as broad, 11-20 veins on longer side, 2-8mm asymmetrical, 6-13mm petiole.

Similar species: several lanceolate-rhombic species: *7 angustiformis, 10 minor, 29 longicaudata, 30 chaterorum,* and the narrower of the nondescript elms such as *5 curvifolia, 13 prominentidens, 20 longidens, 21 coriaceifolia, 45 pseudobovata, 49 prionophylla.*

Roadsides, field margins. Frequent in Hunts, extending into Cambs, Beds, Northants and Leics.

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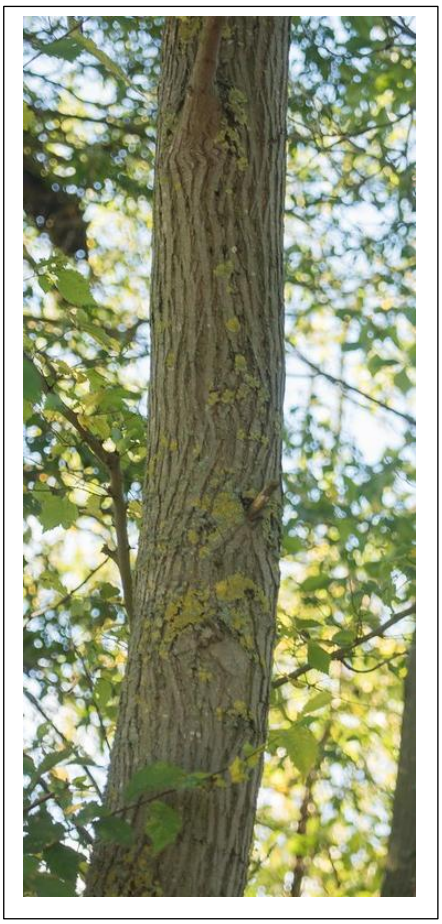

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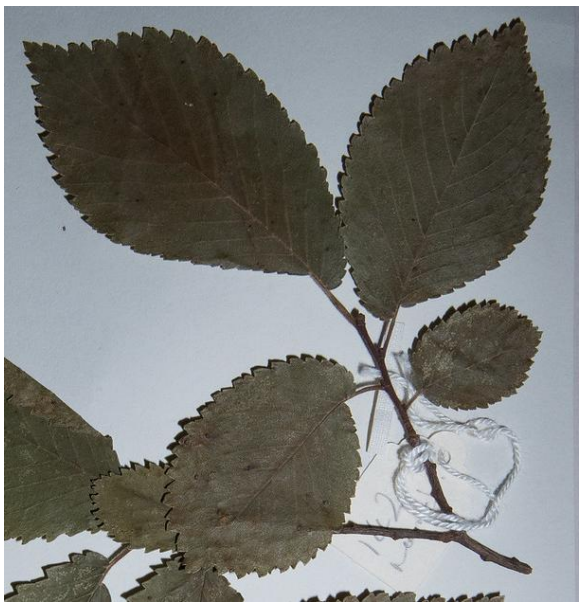
***35 Ulmus serratula* Pebmarsh Elm** One of the 20 or so nondescript smooth-leaved species, in this case with neat, rather broad-ovate or lanceolate leaves. Teeth rather flat-topped and broad, ,medium asymmetry and longish petioles.

Leaves 6-9 x 4-5cm, 1.6-2.1x as long as broad, 13-16 veins on longer side, 4-8mm asymmetrical, 9-13mm petiole.

Similar species: : in addition to the 'nondescript' group, especially *19 obesidens, 21 coriaceifolia, 25 rhombifolia, 32 incisa,, 37 sowerbyi, 45 pseudobovata,* also similar to some small-leaves species such as *8 rasilis, 14 pseudocoritana, 24 peninsularis.*

Hedges, woodland, scattered in Essex and Herts

Currently known only from a few roadside trees around Pebmarsh in north Essex and Navestock Heath in south Essex.



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***36 Ulmus acuminatissima* Pointed-leaved Elm** One of the 20 or so nondescript smooth-leaved species, in this case medium lanceolate with a long acuminate apex. Upperside quite dark green, contrasting with pale underside. Teeth variable, often irregular with some sinuses wide-bottomed, like *32 incisa.* Medium to large asymmetry, with a fairly large downward bulge on the long side, straight or bulging on short side, so may appear almost cordate. Fairly long petioles.

Leaves 5-9 x 3-5cm, 1.5-2x as long as broad, 15-18 veins on longer side, 3-9mm asymmetrical, 7-11mm petiole.

Similar species: fairly distinctive - in leaf outline, not unlike *15 acutissima, 42 atrovirens* Perhaps confusible with some of the nondescript group*: 5 curvifolia, 21 coriaceifooia, 37 sowerbyi,* but all are much less acuminate. i

Hedgerows, scattered in north Essex, single records from Cambs and Norfolk.

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***37a Ulmus sowerbyi* Sowerby's Elm: as described and keyed in Sell & Murrell, probably not the elm of C E Moss.** This is a species very close to *38 asymmetrica,* to which it mayd key. The key in Sell & Murrell will not separate them. One of the more distinctive of the 20 or so nondescript smooth-leaved species, with broad-lanceolate leaves with a short-acuminate apex, a large and well-rounded asymmetry and a long petiole. Differs from *asymmetrica* in several ways: leaf blades mostly oblanceolate, broadest just above the middle (at middle in *asymmetrica),* teeth in apical third larger, more prominent and distinctly irregular, petiole shorter and thicker (9-14mm).

[Measurements to be checked] Leaves 6-8 x 3-4cm, 1.8-2.1x as long as broad, 13-16 veins on longer side, 3-8mm asymmetrical, 9-14mm petiole.

Similar species: in addition to the 'nondescript' group, especially *38 asymmetrica,* may be confused with *19 obesidens, 21 coriaceifolia, 25 rhombifolia, 45 pseudobovata.*

Distribution unclear. Probably confused with *38 asymmetrica*

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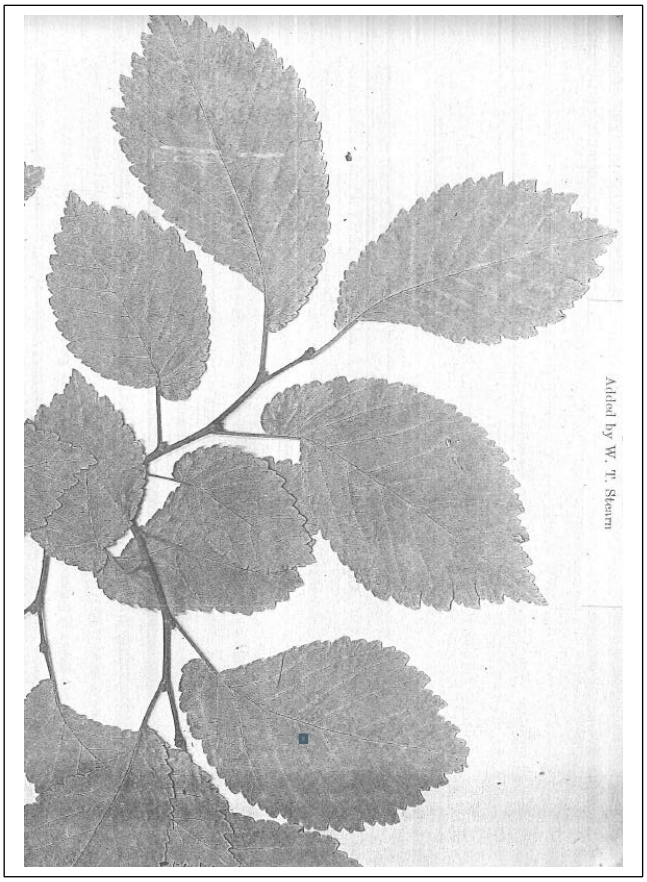
The chosen lectotype specimen is this illustration from Smith & Sowerby's *English Botany* p. 2248, (1811).



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***37b Ulmus sowerbyi* Sowerby's Elm *sensu* Moss: the species C E Moss described in 1914 appears to be distinctive and different from that in Sell & Murrell.** One of the 20 or so nondescript smooth-leaved species, in this case with broad-lanceolate leaves with a blunt, right-angled or shortly acute apex. Leaves widest at middle (unlike 37a), with mostly acute triangle straight teeth which point away from the middle of the leaf, not curling toward the apex, and with only tiny secondary teeth, and prominent teeth extend well into the basal half. Asymmetry shorter and less bulging, petiole shorter and thicker, than in *37a* or *38 asymmetrica.*

[Measurements to be checked] Leaves 6-8 x 3-4cm, 1.8-2.1x as long as broad, 13-16 veins on longer side, 3-8mm asymmetrical, 9-14mm petiole.

Similar species: members of the 'nondescript' group, especially *6 anglosaxonica, 20 longidens, 25 rhombifolia, 28 diversifolia.*

Distribution uncertain: Moss thought it widespread in eastern England and eastern Midlands, but had fewer names to choose from. This Cambridge specimen from 1913 is the only one seen so far.

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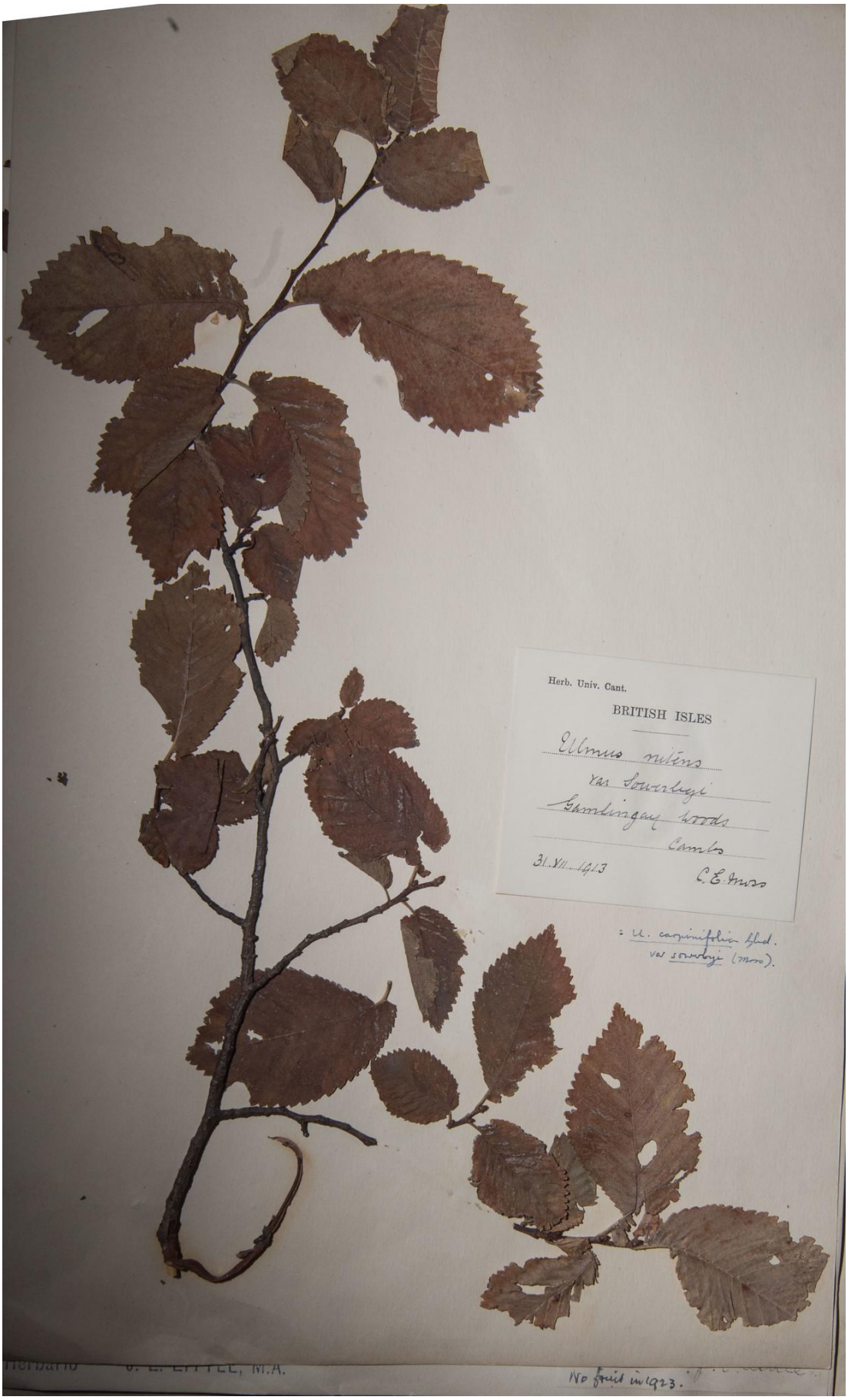

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38 Ulmus asymmetrica **Pale-leaved Elm:** although grouped with the 20 or so nondescript smooth-leaved species, in this case with broad-lanceolate leaves with an acute or short-acuminate apex, this is distinctive. A strikingly pale yellow-green tree, looking like a silver birch in spring. Leaves medium, smooth, fairly broad, very asymmetrical and very long stalked, often rather curled, with quite large rather square and often uneven teeth. Very similar to *37a sowerbyi:* see that species for differences. Once seen, recognisable from a distance. Most regular host of the rare aphid purse-gall, *Kaltenbachiella pallida.*

[Measurements to be checked] Leaves 5-8 x 3-5cm, 1.5-2x as long as broad, 14-17 veins on longer side, 5-15mm asymmetrical, 10-20mm petiole.

Distribution uncertain: thought to be mainly Norfolk, Suffolk, Cambs with outliers in Lincs, Leics and Notts, but confusion with *37a* and *37b 'sowerbyi'* is likely.

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39 Ulmus coritana **Coritanian Elm:** a large broad smooth-leaved species**,** with blunt teeth, very asymmetrical with a large bulge on the longer side of the leaf, and long-stalked. Leaf apex obtuse to short acuminate.

Leaves 5-7 x 3-4cm, 1.7-2.2x as long as broad, 12-17 veins on longer side, 2-6mm asymmetrical, 7-10mm petiole.

Similar species: like a small-leaved 53 *U. vegeta or 59 hollandica* but with blunter teeth; smooth-leaved *U. procera* with much larger asymmetry; more like *46 obesifolia* (acute teeth, glossy and 'scruffy') or *52 daveyi* (larger leaves, shorter asymmetry and petiole, crowded leaves).

By roads, tracks, footpaths and in hedges and copses, Norfolk, Suffolk, Cambs, north Essex, Beds, Northants, Leics, Notts and possibly further north.

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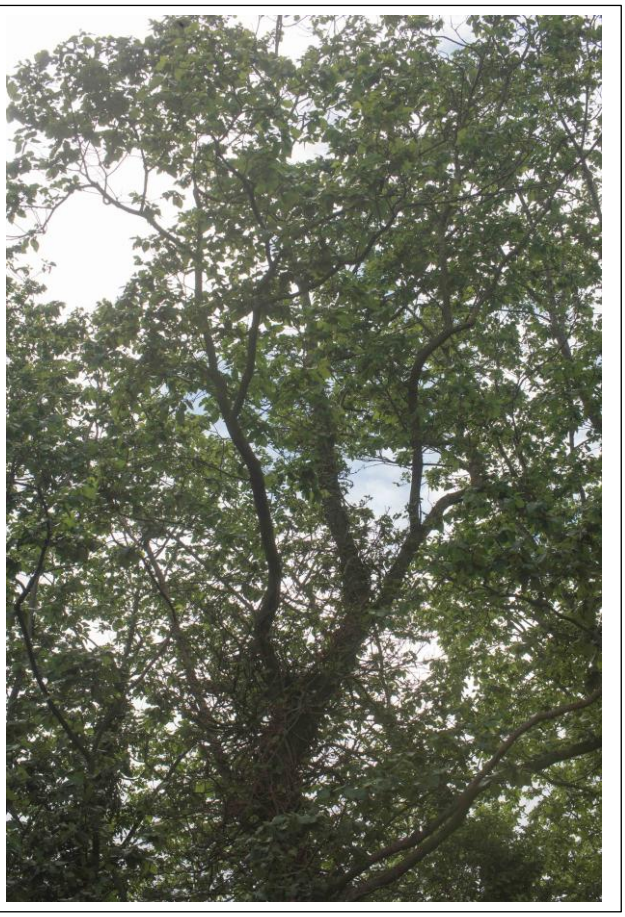

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40 Ulmus procera **English Elm:** one of a pair of very similar small, round-leaved, rough-leaved species. The pair have coarse toothing, short or very short asymmetry and stalk. Usually heavily pocked with small mite galls, *Aceria campestricola,* and the commonest 'scruffy hedgerow suckering elms'. When (now very rarely) mature, narrowly domed or columnar crown with a figure-of-eight shape – broad crown, narrow waist, broad skirt.

Leaves 6-9 x 4-7cm, 1.2-1.6x as long as broad, 10-16 veins on longer side, 3-7mm asymmetrical, 5-9mm petiole.

Similar species: very similar to *41 proceriformis,* which is no more than 4mm asymmetrical, and has a slightly shorter petiole and on average fewer veins. Like a small-leaved *56 gyrophylla*.

By roads, tracks, hedges, field margins, copses, can be invasive in woodland, abundant in much of southern and central England, usually as self-coppiciing hedgerow shrubs.

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41 Ulmus proceriformis **Atinian Elm: :** one of a pair of very similar small, round-leaved, rough-leaved species. The pair have coarse toothing, short or very short asymmetry and stalk. Usually heavily pocked with small mite galls, *Aceria campestricola,* and the commonest 'scruffy hedgerow suckering elms'. When (now very rarely) mature, this is lower than *40 procera,* round-topped with a broadly-domed crown. Good evidence that it was introduced by the Romans to grow vines up.

Leaves 5-8 x 3-6cm, 1.1-1.6x as long as broad, 10-13 veins on longer side, 1-4mm asymmetrical, 3-7mm petiole.

Similar species: very similar to *40 procera,* which is up to 7mm asymmetrical, and has a slightly longer petiole and on average more veins. Like a small-leaved *56 gyrophylla*.

By roads, tracks, hedges, field margins, copses, often in river valleys. Widespread and locally abundant in southern half of England and parts of west Wales.

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42 Ulmus atrovirens **Dark-leaved Elm** Fits with either the very tapered smooth-leaved elm or the crenate-leaved species. Young leaves may be rough but quickly becoming smooth-leaved (so will not key in Sell & Murrell). Fairly long, tapered leaves with a large rounded lobe at the base and quite long petioles, and distinctive rather blunt, not quite crenate teeth. Also quite strongly zigzag twigs.

Leaves 6-9 x 3-5cm, 1.7-2x as long as broad, 12-16 veins on longer side, 2-6mm asymmetrical, 9-11mm petiole.

Similar species: quite similar to *15 acutissima,* which is even more bluntly crenate teeth. Leaves longer and more tapered than *11 plotii, 27 pseudelegantissima, 31 elegantissima,* which have similarly crenate leaves. *17 sylvatica* has even longer narrower leaves and smaller teeth.

By roads, tracks, hedges, field margins, around Halstead-Braintree-Colchester in Essex. Also occasionally on fen droves in north Cambs.

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43 Ulmus crenata **Hayley Elm** Variable in leaf shame, medium-leaved, lanceolate-rhombic or rounded obovate, initially rough but may quickly become smooth-leaved (so may be not key at present). Terminal leaves often serrate but those lower down blunt-toothed or neatly crenate. Teeth variable, often with some single-toothed (no small teeth on large teeth) among double-teeth. Moderately asymmetrical but with a small, narrow rounded bulge. Petiole medium-long.

Leaves 5-10 x 3-6cm, 1.5-2x as long as broad, 11-19 veins on longer side, 1-6mm asymmetrical, 7-10mm petiole.

Similar species: fairly distinctive. *48 cantabrigiensis,* has much more jagged teeth and almost no asymmetry, *45 pseudobovata* is more sharp-toothed and rather longer asymmetry.

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44 Ulmus madingleyensis **Madingley Elm** One of the 5 or so rough-rhombic-to-rounded leaved elms. Rather lacking in distinctive features, broadly lanceolate-ovate, shortly acuminate leaves, it has fairly symmetrical leaves with fairly small sideways-jutting bulges (not projecting far below the point of attachment of lamina to midrib), medium rather thin petioles, and rather even squarish teeth, often with one large secondary tooth so that some teeth appear double-tipped.

Leaves 5-11 x 3-6cm, 1.5-2x as long as broad, 13-20 veins on longer side, 2-7mm asymmetrical, 5-12mm petiole.

Similar species: among rough-leaved elms, rather like *45 pseudobovata*, otherwise more similar to nondescript smooth elms such as *5 curvifolia, 19 obesidens, 20 longidens, 32 incisa*, and also similar to some small-leaves species such as *8 rasilis, and 24 peninsularis.*

Currently known only from the ancient Madingley Wood, Cambs.

Note: field photo taken after rain, hence glossy leaves

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45 Ulmus pseudobovata **Sacombe Elm** One of the 5 or so rough-rhombic-to-rounded leaved elms, but quickly becoming smooth (so, currently impossible to key). Rather lacking in distinctive features, leaves fairly narrowly lanceolate-rhombic or slightly oblanceolate (widest a little above the middle, but tapering much more rapidly toward the shortly acuminate apex than the tapered base). It has fairly symmetrical leaves with fairly narrow downward bulges, medium to short petioles, and rather neat triangular teeth, with those on the 'shoulders' sometimes a little larger than the rest. Long shoots can be quite strongly zigzag.

Leaves 5-7 x 3-4cm, 1.8-2x as long as broad, 11-20 veins on longer side, 2-8mm asymmetrical, 3-9mm petiole.

Similar species: among rough-leaved elms, rather like *44 madingleyensis*, otherwise more similar to nondescript smooth elms such as *5 curvifolia, 19 obesidens, 20 longidens, 32 incisa*, and also similar to some small-leaves species such as *8 rasilis, and 24 peninsularis.*

Roadsides, hedges. Currently known only from the area around Dane End and Sacombe, between Ware and Stevenage, Herts.

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46 Ulmus obesifolila **Fat-leaved Elm** Treated as one of the 5 or so rough-rhombic-to-rounded leaved elms in Sell & Murrell, but quickly becoming smooth and glossy (so, currently impossible to key). By mid summer, glossy, often wrinkled along midrib, as if veins are deep-impressed, looks rather 'scruffy' with unevenly convex leaves. At all stages, the almost complete lack of hairs on the underside is a distinctive feature: axillary tufts, if present, are barely visible without a hand lens. Leaves often broadly round, almost circular, with a short cuspidate apex. Fairly large, neat and even teeth, each tooth triangular with 2-3 tiny secondary teeth alongside each large primary tooth, usually 2 small teeth basad and one apicad. Medium to large asymmetry, usually very broad and sometimes overlapping the rather short petiole.

Leaves 5-9 x 3-5cm, 1.2-1.9x as long as broad, 14-20 veins on longer side, 2-9mm asymmetrical, 4-9mm petiole.

Similar species: among rough-leaved elms, rather like a large, neater-toothed *40 procera, 41 proceriformis,* or a less jagged more rounded *56 gyrophylla.* When smooth and glossy, more likely to be mistaken for *39 coritana.*

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47 *Ulmus crassa* **Laxton Elm** One of the five very large-leaved, rough-leaved elms, closely allied to Wych Elm *U. glabra.* This is a very broad-crowned tree, mature specimens considerably broader than tall. Leaves variabl, from *61. U. glabra* to *60 scabra,* but smaller, not more than 12cm long (up to 18cm in *glabra*). Short-shoot leaves narrowly lanceolate-oblanceolate (2-3 times as long as broad, broadest at or just above the middle), but leaves on longer shoots and suckers often much broader, like *60 U. scabra.* Leaves rarely or never have 'shoulder-teeth' as in most other elms in this group. Fairly long-acuminate, with a large lobe at the base and quite long petioles, and distinctive rather blunt, obtuse or even cuspidate teeth.

Leaves 8-12 x 3-6cm, 2-3x as long as broad, 21-24 veins on longer side, 4-7mm asymmetrical, 6-9mm petiole.

Similar species: *50 U. mossii, 60 U. scabra, 61 U. glabra, 62 U. camperdownii.* All but *50 mossii* have much larger leaves. *50 U. mossii* has distinctive long, gland-tipped hairs on its young twigs (but not on petioles).

Roadsides, hedges, gardens Currently known only from the area around Laxton in north Northamptonshire, older record from Hertfordshire.

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48 Ulmus cantabrigiensis **Woodland Elm** One of the 5 or so rough-rhombic-to-rounded leaved elms in Sell & Murrell, and remaining rough throughout the summer, with neatly diamond-shaped or broadly lanceolate leaves, almost symmetrical at the base and with medium petioles. A tall, slender tree with a conical or pyramidal crown and a trunk continuing almost to the top.

Leaves 6-10 x 4-6cm, 1.5-2x as long as broad, 12-17 veins on longer side, 1-4mm asymmetrical, 6-11mm petiole.

Similar species: some leaves of *43 crenata* can look very similar. Might be confused with *44 madingleyensis* and *45 pseudobovata*. Beware young trees growing in shade – some smooth-leaved elms can be rough-leaved in shade.

Mainly ancient woodlands in Cambridgeshire, known from about 6 sites so far.

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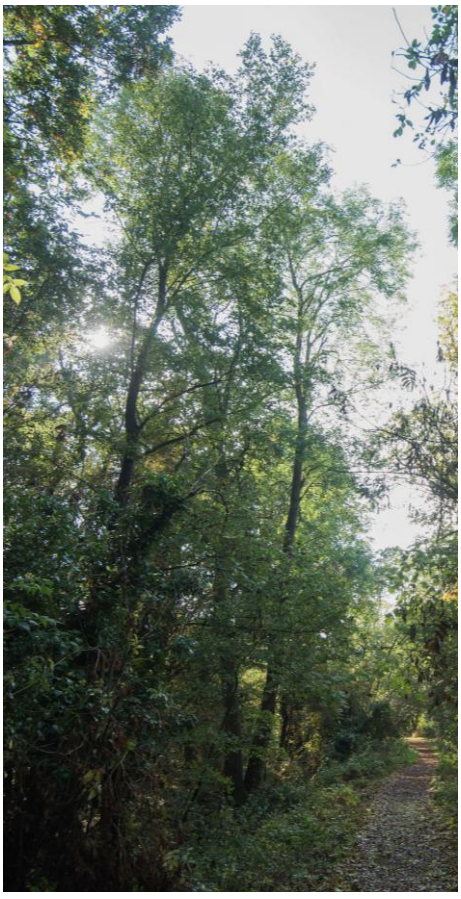

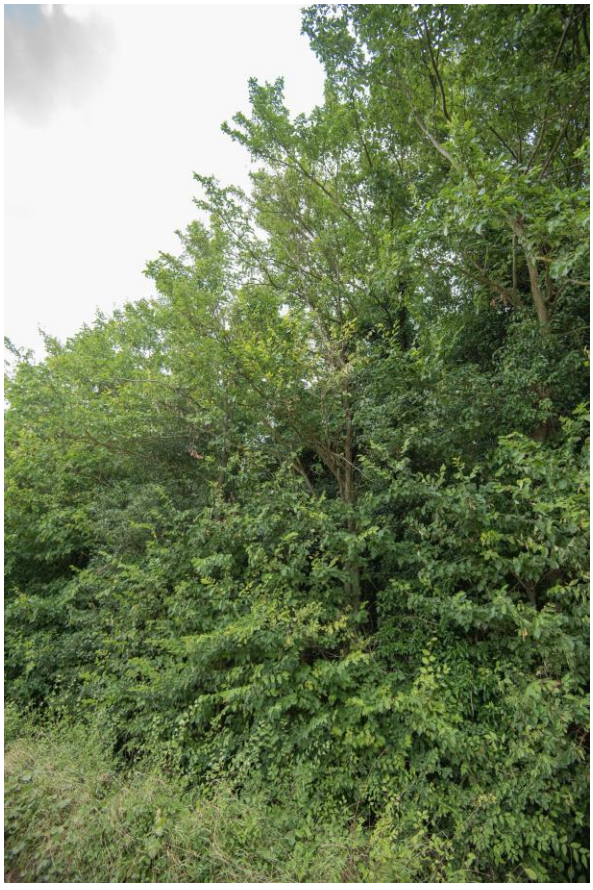

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***49 Ulmus prionophylla* Large-toothed Elm:** fairly large, broad-leaved smooth-leaved elm with wide but fairly shallow teeth in upper half of leaves, with a short or very short asymmetry but fairly long stalks. One of the smooth, jagged-leaved elms, either broadly lanceolate or rhombic, with prominent triangular teeth around most of the leaf, continuing almost to the base. The teeth in the upper half are generally very broad, and variably llong and pointed. Symmetrical to slightly asymmetrical, Quite symmetrical or shortly asymmetrical, with a medium, rather broad and angular bulge, and medium-petioled.

Leaves 6-9 x 3-5cm, 1.6-2.4x as long as broad, 13-21 veins on longer side, 2-6mm asymmetrical, 6-9mm petiole.

Similar species: like a larger longer-leaved *6 anglosaxonica* or a less asymmetrical *13 prominentidens* or *16 longidentata.* Might also be confused with *18 serratifrons, 26 multidentata* or *29 longicaudata.*

Roadsides, hedges, copses and field margins, scattered records in North Essex, East Suffolk, East Norfolk and Huntingdonshire.

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***50 Ulmus mossii* Moss's Elm:** One of the five very large-leaved, rough-leaved elms, this is closest to *60 U. scabra* from which it differs in having gland-tipped hairs on the *soft young* twigs: the blobs at the tips of the hairs start clear and turn whitish then brownish as they age. A broad-leaved, rough-leaved, dark green rather corrugated elm, sometimes with 'shoulder-teeth' on the leaves, short-tapered, short-asymmetried (often with longer side lobe overlapping petiole) and fairly short petioled.

Leaves 10-15 x 6-9cm, 1.5-2x as long as broad, 16-26 veins on longer side, 2-8mm asymmetrical, 3-7mm petiole.

Similar species:*, 60 U. scabra, 62 U. camperdownii.* are similar in shape but larger-leaved. *47 U. crassa, 61 U. glabra,* have proportionately longer, narrower leaves.

Hedgerows, roadside, copses, widespread in England from Cornwall to Derbyshire, Essex, Suffolk, Norfolk, and in Cards.

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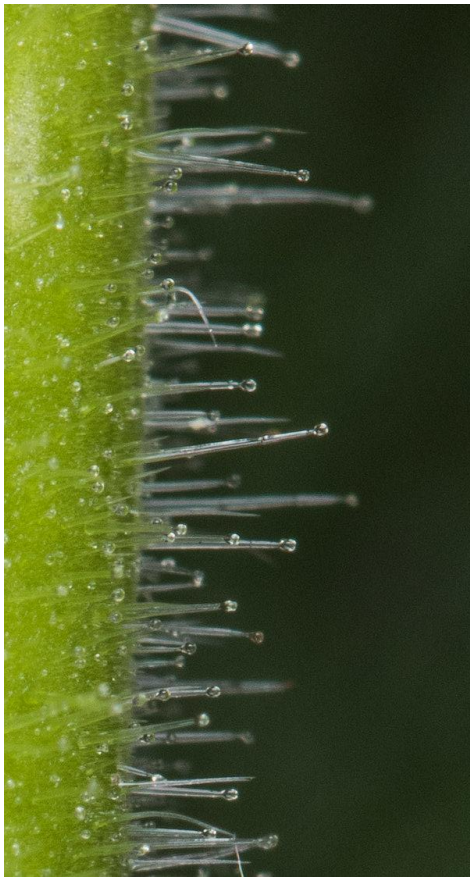

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***51 Ulmus occidentalis* Western Elm:** One of a small group of broad-leaved, rough-leaved elms with prominent jagged teeth. Broadly ovate, moderately acuminate leaves with fairly large, forward-pointing teeth in the upper half. Larger-leaved, narrower and more tapered and pointed-leaved than *40 procera* and *41 proceriformis.* Teeth shorter and less curved than *55 exoniensis.* Very close to *56 gyrophylla* and *57 scabrosa,* which have larger more tapered leaves (see Note 9, p. 54).

Leaves 6-11 x 4-7cm, 1.4-1.7x as long as broad, 11-20 veins on longer side, 2-8mm asymmetrical, 3-9mm petiole.

Similar species: *40 procera, 41 proceriformis, 55 exoniensis, 56 gyrophylla, 57 U. scabrosa* perhaps *58 U. insularum.*

Hedgerows by roads, tracks and field margins, Common in Cornwall, just extending into Devon. Several records from Cardiganshire.

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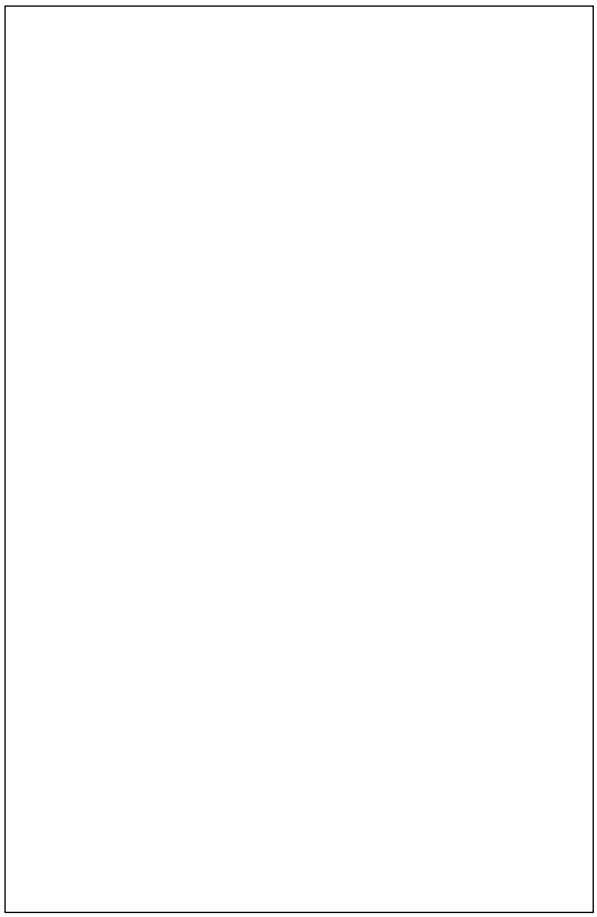

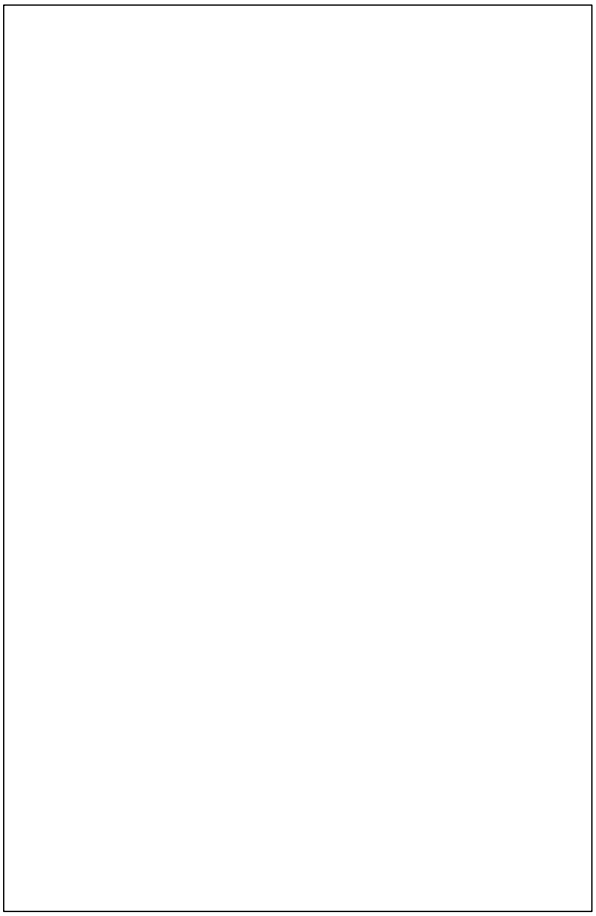

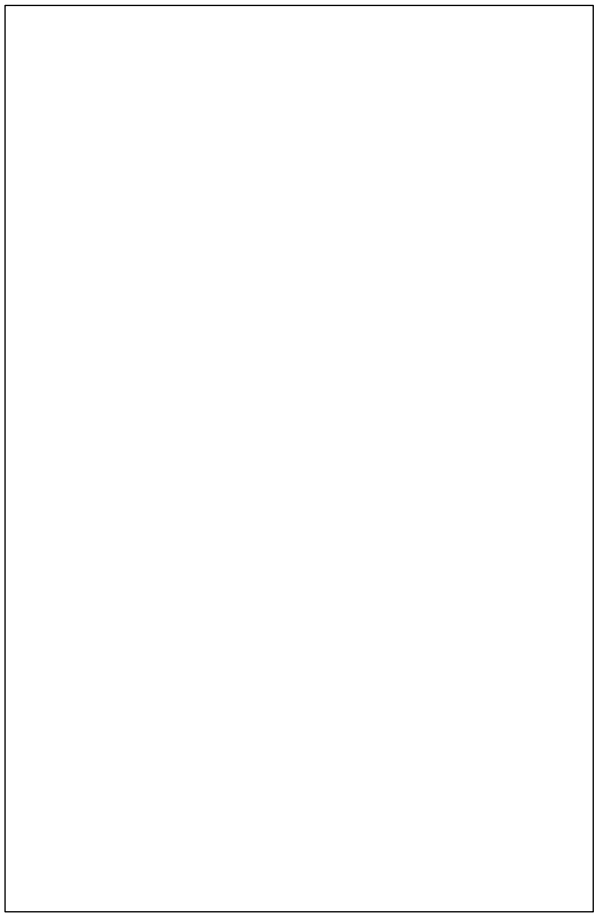

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52 Ulmus daveyi **Davey's Elm:** a large broad smooth-leaved species**,** with blunt teeth, moderately asymmetrical with a fairly large bulge on the longer side of the leaf, and medium-stalked. Leaf apex obtuse to short acuminate. Leaves tend to look crowded on the twigs.

Leaves 5-10 x 5-7cm, 1.5-1.7x as long as broad, 15-22 veins on longer side, 6-9mm asymmetrical, 6-10mm petiole.

Similar species: like a larger-leaved proportionately less asymmetrical *39 U. coritana*; smooth-leaved *U. procera* with much larger asymmetry, or *46 obesifolia* (acute teeth and 'scruffy').

By roads, hedges and in valleys. Widespread in Cornwall, extending into Devon, Dorset and Hampshire, with scattered records from Herefordshire, Cardiganshire, Hertfordshire, Bucks, Norfolk, Suffolk and Cambs.

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53 Ulmus vegeta **Huntingdon Elm:** a large broad smooth-leaved species**,** with pointed, forward-curved teeth, strongly asymmetrical with a large downward bulge on the longer side, and often a sigmoidal curve on the short side as the leaf-blade joins the lowest vein 1-4mm from the midrib. Leaf apex cuspidate to acuminate. Very close to *U. hollandica* but with generally longer, narrower, more acuminate leaves, some twice as long as wide. May be slightly rough-leaved when young, but usually soon smooth and shiny, and less rough than the broader-leaved 54 Bassingbourn Elm, *U. platyphylla*.

Leaves 8-16 x 5-9cm, 1.5-2x as long as broad, 12-22 veins on longer side, 6-18mm asymmetrical, 9-16mm petiole.

Similar species: very close to 54 Bassingbourn Elm, *U. platyphylla and 59 U hollandica,* see Note 10 on p. 55. May be confused with *39 U. coritana* but with sharp teeth, larger-leaved, more asymmetrical and longer-stalked

Said to have originated in Hinchingbrooke Park, Huntingdon, in 1747, now widely planted by roads, hedges and wood margins, in towns and cities as well as the countryside.

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54 Ulmus platyphylla **Bassingbourn Elm** One of a small group of broad, round-leaved, rough-leaved elms with broad but not very jagged teeth. Rather variable, broadly ovate, short-acuminate or cuspidate leaves with very broad-based, rather short, somewhat forward-curving teeth in the upper half. Quite strongly asymmetrical, often with a downward bulge, often sigmoidal curves as the leafbase joins the medium stalk. Rather few-veined.

Leaves 7-13 x 5-8cm, 1.3-2.1x as long as broad, 9-16 veins on longer side, 2-9mm asymmetrical, 6-11mm petiole.

Similar species: Very close to 53 *U. vegeta* and *59 U. hollandica,* see Note 10 on p. 55. Fairly similar to *56 gyrophylla* and *57 scabrosa,* which have smaller leaves and less sharp, less curved teeth. Much larger-leaved than *40 procera* and *41 proceriformis.* Teeth shorter and less curved than *55 exoniensis.*

Field margins and hedgerows Bassingbourn, East Hatley and Bottisham, Cambridgeshire.

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55 Ulmus exoniensis **Exeter Elm** One of a small group of large, broad-leaved, rough-leaved elms with prominent jagged teeth, but unlike any other in having the largest, longest, most prominent and claw-like teeth of any British elm. Apparently cultivated specimens often have curled or crinkled leaves but the few I have seen in Cambs have had fully open leaves. Very broadly ovate or obovate, moderately acuminate leaves with large, curved, forward-pointing teeth in the upper half, small obtuse teeth in the basal third. Often with prominent and very long 'shoulder teeth'.

Leaves 8-11 x 6-8cm, 1.3-1.5x as long as broad, 17-19 veins on longer side, 7-9mm asymmetrical, 5-10mm petiole.

Similar species: quite distinctive with the claw-like teeth, in overall shape perhaps a broad-leaved, long-toothed *56 gyrophylla, 57 U. scabrosa, 60 U. scabra* or perhaps *58 U. insularum.*

Apparently brought into cultivation by a nursery in Exeter in 1829 and for a time widely planted in parks and garens. Now occasional on road verges, widely scattered.

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***56 Ulmus gyrophylla* Corky-barked Elm:** One of a small group of broad-leaved, rough-leaved elms with broad but fairly short teeth. Broadly ovate to lanceolate, broadest in middle or slightly below, moderately acuminate leaves with large, about right-angled teeth in the upper half, smaller and narrower toward the base.

Leaves 7-12 x 4-7cm, 1.2-1.8x as long as broad, 15-19 veins on longer side, 4-8mm asymmetrical, 5-11mm petiole.

Similar species: very similar to *51 occidentalis* (which has smaller teeth and broader, less tapered leaves), and *57 scabrosa.* which more prominent more curved teeth. See Note 9, p. 54. Much larger-leaved, narrower, more tapered and pointed-leaved, with longer petioles than *40 procera* and *41 proceriformis.* Teeth much shorter and less curved than *55 exoniensis.*

By roads, tracks, field margins, in hedges and copses. Widespread in Norfolk, Suffolk and Leicestershire, scattered in Cambs and Essex, with outliers in Wiltshire, Sussex, Herefordshire,

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***57 Ulmus scabrosa* Scabrid Elm:** One of a small group of broad-leaved, rough-leaved elms with prominent rather jagged teeth. Broadly ovate, moderately acuminate leaves with large, forward-pointing teeth in the upper three-quarters, small obtuse teeth in the basal third. Fairly short asymmetry and petiole.

Leaves 7-12 x 4-7cm, 1.5-2x as long as broad, 10-20 veins on longer side, 4-8mm asymmetrical, 6-8mm petiole.

Similar species: Very close to *51 occidentalis* and *56 gyrophylla,* which have slightly smaller, on average broader and less acuminate leaves. Larger-leaved, narrower and more tapered and pointed-leaved than *40 procera* and *41 proceriformis.* Teeth shorter and less curved than *55 exoniensis.*

Hedgerows and copses by roads, tracks and field margins, and woods along beaches. Frequent in southern Cornwall, scattered records elsewhere in Cornwall, one record from Devon and a few in Cardiganshire.

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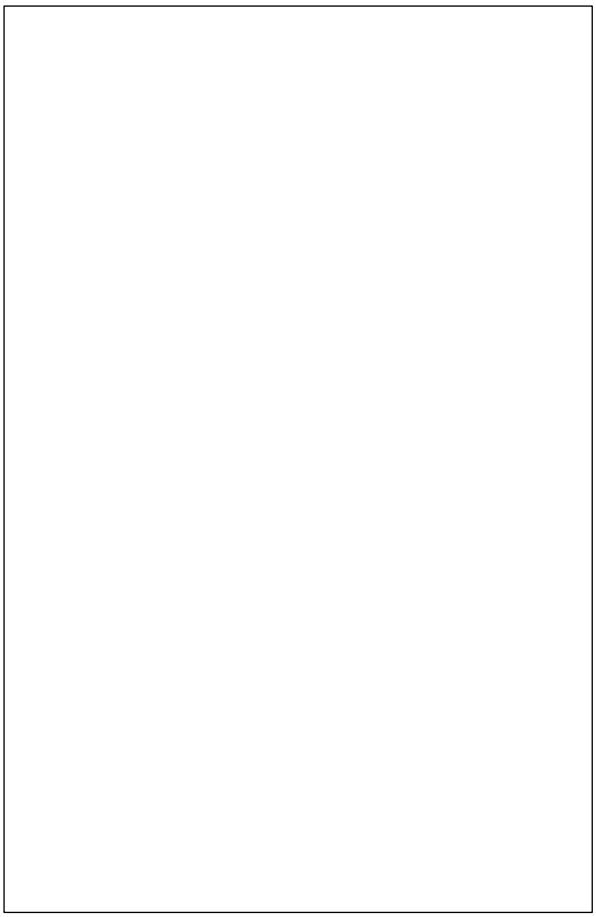

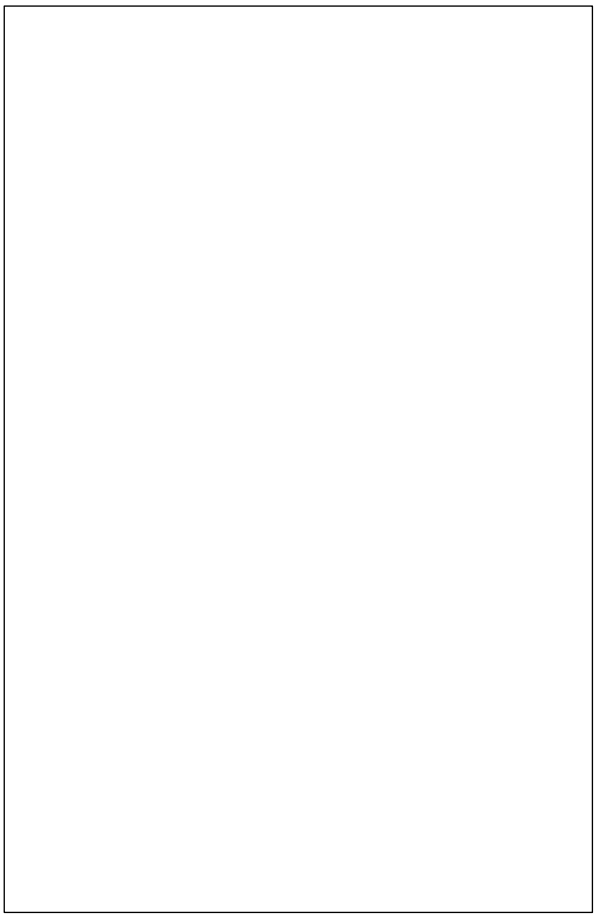

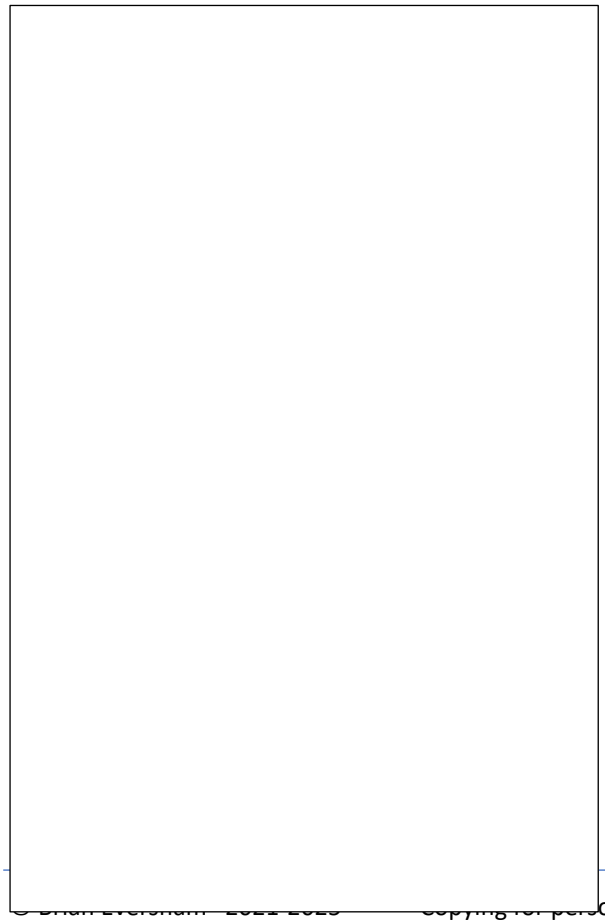

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59 Ulmus hollandica **Dutch Elm:** a large broad smooth-leaved species**,** with pointed, forward-curved teeth, strongly asymmetrical with a large downward bulge on the longer side, and often a sigmoidal curve on the short side as the leaf blade joins the first vein 1-4mm from the midrib. Leaf apex cuspidate to short-acuminate. Leaves sometimes start rather rough but end smooth and fairly glossy by mid summer, close to *53 U. vegeta.*

Leaves 7-14 x 4-8cm, 1.5-1.8x as long as broad, 13-21 veins on longer side, 4-13mm asymmetrical, 6-13mm petiole.

Similar species: Very close to *53 U. vegeta* and 54 *U. platyphylla,* see Note 10 on p. 55. May be confused with *39 U. coritana,* but larger leaved and with sharp teeth. Note: keys in Stace and Sell & Murrell may produce different results.

Widely planted by roads, in hedges, wood margins and parks in towns and cities as well as the countryside. Widely distributed from Cornwall to East Anglia, north to Yorkshire and south Wales.

Peter Sell named some specimens as '*U. pseudohollandica'* but the name seems never to have been defined or published, and I cannot yet see any consistent differences.

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***60 Ulmus scabra* Southern Wych Elm:** One of the five very large-leaved, very rough-leaved elms, often with prominent shoulder teeth, especially on suckers. Few if any leaves as much as 2x as long as wide. Stalk short, thick and hairy, the short asymmetry often overlapping and hiding stalk. The common Wych Elm of southern and central England.

Leaves 8-17 x 4-11cm, 1.6-2.1x as long as broad, 16-26 veins on longer side, 2-8mm asymmetrical, 3-7mm petiole.

Similar species:*, 50 U. mossii* is similar but smaller-leaved and with glandular hairs on young twigs; *62 U. camperdownii.* are similar in shape but larger-leaved; *47 U. crassa* and *61 U. glabra,* have proportionately longer, narrower leaves; *55 U.exoniensis* has longer more curved teeth.

In woods, including ancient woods, copses and parks, on sea cliffs, mountain cliffs and riversides, in hedgerows, on roadsides. Probably throughout Britain and Ireland, far commoner than *61 U. glabra* in southern and central England as far north as Yorkshire, less common in Scotland.

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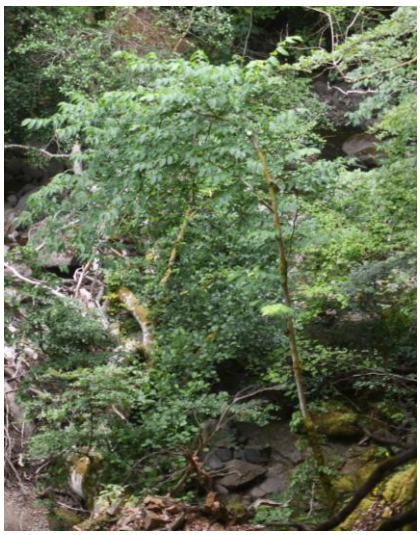
61 Ulmus glabra **Northern Wych Elm:** One of the five very large-leaved, very rough-leaved elms, often with prominent shoulder teeth, especially on suckers. Most large leaves on short shoots 2-3 times as long as wide. Stalk short, thick and hairy, the variable asymmetry often overlapping and hiding stalk. The common Wych Elm of Scotland and northern England, but uncommon or absent in central and southern England.

Leaves 10-18 x 4-9cm, 2-3x as long as broad, 17-27 veins on longer side, 3-13mm asymmetrical, 3-6mm petiole.

Similar species:*, 47 U. crassa* is similar but smaller-leaved, *50 U. mossii, 55 U.exoniensis* and *60 U. scabra* are shorter and broader-leaved, *mossii* with glandular hairs on young twigs and *exoniensis* with longer and more curved teeth; *62 U. camperdownii* has even larger and broader leaves and is usually weeping (but beware *U. glabra* var. *pendula*).

In woods, copses and river valleys. Widespread in northern and western Britain and Ireland, especially in the hills. Very largely replaced by *60 U. scabra* in the south and east.



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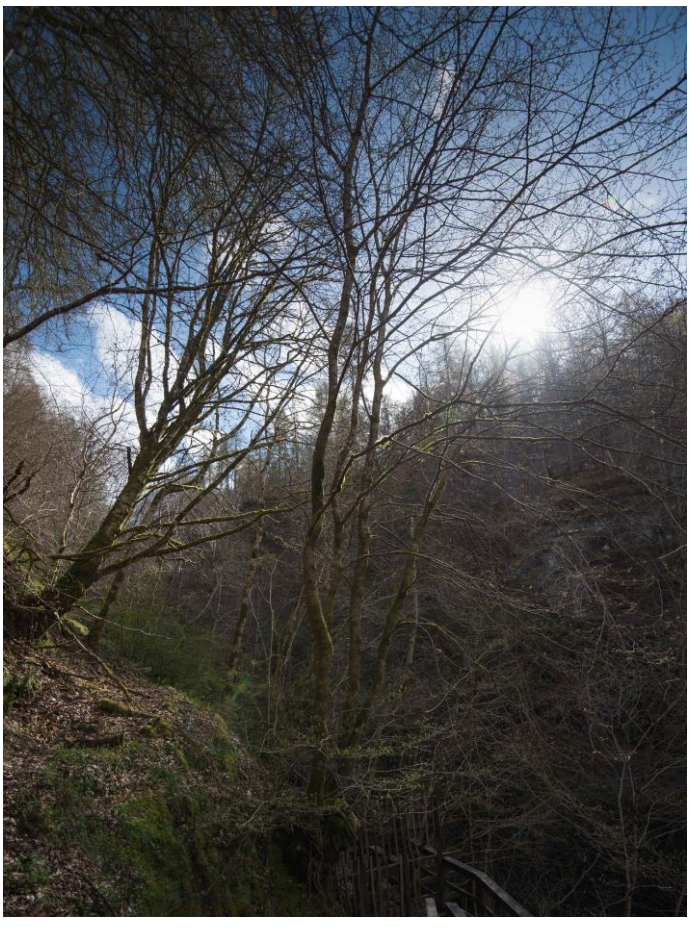

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***62 Ulmus camperdownii* Camperdown Elm:** The largest-leaved British elm, one of the five very large-leaved, very rough-leaved elms. Often but not always a weeping tree with flexuous down-arched branches. Leaves obovate, with a short cuspidate tip and often with one or more prominent shoulder teeth at either side. Quite strongly asymmetrical, with rather rectangular bulges, but with a short stalk. Suckers from weeping trees may grow upright, like very large-leaved *60 U. scabra.*

Leaves 14-18 x 8-11cm, 1.6-1.8x as long as broad, 18-25 veins on longer side, 11-14mm asymmetrical, 6-8mm petiole.

Similar species: when weeping, confusable only (?) with the pendant form of *61 U. glabra,* which has longer, narrower leaves, often 2-3x as long as broad. Leaves broader and much larger than *47 U. crassa,* similar in shape to *60 U. scabra* but these are much smaller. Occasionally planted in its weeping form on parks, gardens and churchyards, rarely in semi-natural habitats.

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