Elms: a new key following Sell & Murrell's classification

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Introduction

Elm classification in standard floras in Britain has varied hugely since the second world war:

Clapham, Tutin and Warburg (1952): 7 species, 2 subspecies, 3 varieties 3 hybrids, total 15 taxa, based on the thinking of R Melville (1903-1985).

Clapham, Tutin & Moore (1987): 2 species, *U, glabra* and *U. minor* based on the approach of R H Richens (1919-1984), who would also have recognised *U. x hollandica* as the hybrid between the two.

Stace (2019): 7 species, 5 subspecies, 7 hybrids, a total of 19 taxa.

Having tried to use the above floras on many occasions, I think none of their *Ulmus* keys works very well, and a lot of elms appear intermediate between their taxa.

The final volume of Sell & Murrell's *Flora of Great Britain and Ireland* was published in March 2018. The elm account is largely based on Jayne V Armstrong's Cambridge PhD (1992), supervised by Peter Sell. This *Flora* takes a radically different approach, with 62 named species, raising previous 'hybrids' and most 'subspecies' and varieties to 'species'. Forty of the 'species' were named new to science (Stace notes that most of these fall within his *U. minor ssp. minor*). Sell argued that these could be considered 'microspecies' even though elms are not apomictic: many elms may have reproduced mainly vegetatively since the warmer Bronze Age. Sell also suggested that there were few if any intermediates between the 62 taxa.

How distinct are Sell & Murrell's 'species'?

Because so many of the 'species' are described from my local patch, I decided to have a go with the new classification. Four years on, I have re-found 41 species at their type localities, a further 12 at sites recorded by Armstrong or Sell, and in all, I've got to know 61 of the 62 species in the *Flora*. The only potentially native species I've not yet seen is Guernsey Elm, *U. insularum*.

My experience so far is that, with practice, about half the new 'species' are readily recognised in the field, and most of the others can be worked out with a few simple measurements. A handful are less well defined and may need comparison with herbarium material, and there are a couple of species-pairs which I still struggle to distinguish.

Origins and status of British elms

Elms have been important trees in the British landscape for most of the present interglacial, arriving at least 9000 years ago. Their abundance has varied (including the very rapid 'elm decline' about 6300 years ago, and subsequent recovery after about 1000 years). Unfortunately, neither pollen nor preserved timber can be reliably identified any more precisely than '*Ulmus* sp.', and elm leaves are very rarely preserved, so there is no easy way to decide which of the different elms were present where, and which are native and which introduced.

All authors agree that 'Wych Elm *U. glabra'* is a long established native. In Sell & Murrell's classification, this is divided into a northern and southern species by Sell & Armstrong: *U. glabra* (northern, formerly subsp. *montana*) and *U. scabra* (southern, subsp. *glabra*). (**Figures 1, 2**)

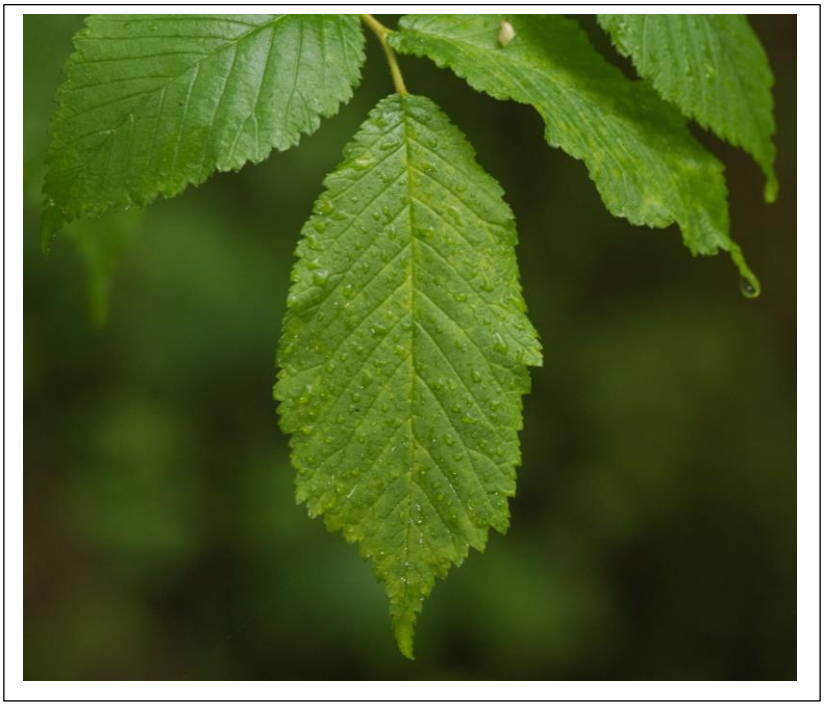

Figure 1:

Northern Wych Elm, *Ulmus glabra,*

Birks of Aberfeldy, Perthshire

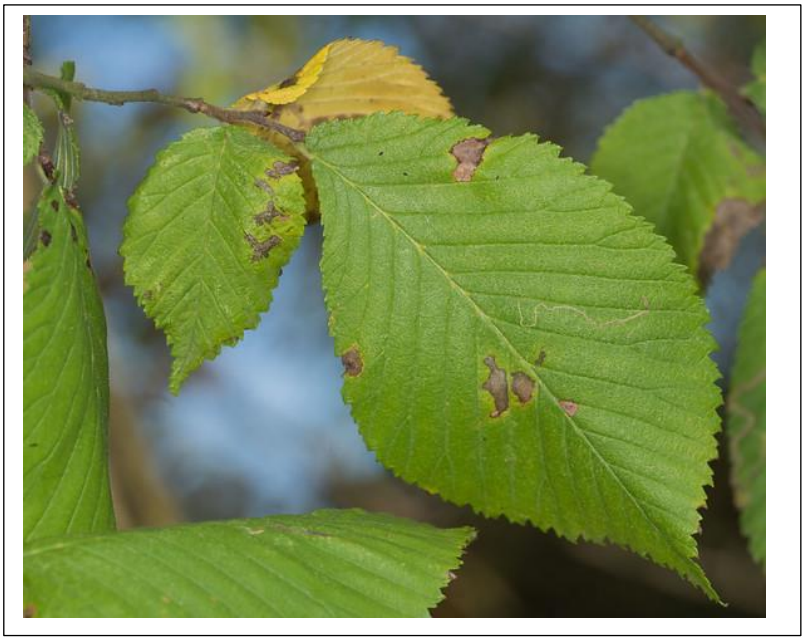

Figure 2:

Southern Wych Elm, *Ulmus scabra,*

Dullingham, Cambridgeshire

Some elm specialists, such as R H RIchens (1919-1984), have regarded all elms apart from Wych Elm to be introductions, allegedly brought over by each wave of colonising people, and growing only where people have planted them. Based on that hypothesis, Richens argued that most elms should be named as cultivars.

Richens spent his summers in France studying elms for two decades, but did not find most of the eastern English elms there, and few have so far been found in mainland Europe. Fifty of the 62 species in Sell & Murrell are listed as British endemics. In the absence of palaeoecological evidence, and given their occurrence in natural habitats, and their biogeographic patterns which resemble species in other genera, I see no reason to assume that many of the others are not also native.

Dutch Elm Disease and surviving elms

I think many of us suffer from 'elm blindness', believing that most or all elms have gone because of Dutch Elm Disease, and that what remains cannot be identified. Forest Research has said that there are now more elms in the English countryside than before the current bout of Dutch Elm Disease. My experience, in tracking down trees recorded in the 1980s or earlier, is that I can re-find over 90% of trees recorded by Armstrong or Sell. Most are not the massive mature trees they refer to, but the regrowth from most of them now reaches 8-10m, and a lot are taller than that. Again, about 90% of elms produce leaves suitable for identification (except for hedgerow elms which are severely strimmed annually).

Distribution and ecology of the 'species'

Less than a dozen of the 62 species are widespread. Many appear to be geographically restricted, with a cluster of a dozen or so in Essex (some of which I have also found in Kent), 30 or so in East Anglia and/or the east Midlands, and 6 or so in Cornwall and the South-West. Many species are rather more widespread than Sell & Murrell suggest, but their true distributions will only become known if more recorders attempt to use the new classification.

Many of the new species seem also to be ecologically restricted. Six are largely found in ancient woodland (**Figures 3, 4, 5**), several apparently mainly in old hedgerows (**Figures 6, 7**), a few within and on the edge of Fenland (**Figure 8**) and a few mainly beside rivers (**Figure 9**). I also get the impression that many of the 16 or so elm gall-causers and the 200+ plant-feeding insect species which live on elm are able to tell the difference between the species, and not just between 'Wych', 'English' and 'Smooth-leaved': they may be abundant on one smooth-leaved elm species and absent from several others growing a few metres away.

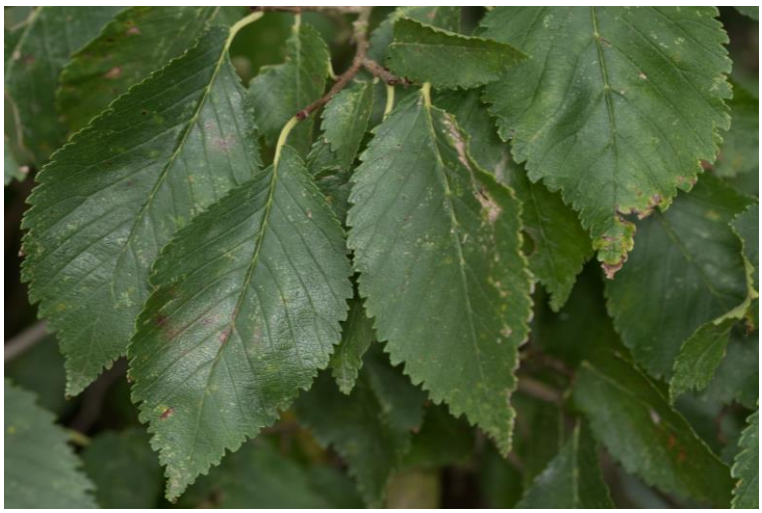

Figure 3:

Woodland Elm, *Ulmus cantabrigiensis,*

Buff Wood, Cambridgeshire

A fairly small-leaved, rough-leaved elm so far known from ancient woods in Cambs and Norfolk

Figure 4: Hatley Elm, *Ulmus sylvatica*

Buff Wood, Cambridgeshire

A smooth-leaved elm with fine-toothed, long-tapered willow-like leaves, known from ancient woodland and fen droves in Cambridgeshire

Figure 5: Hayley Elm, *Ulmus crenata,*

Hayley Wood, Cambridgeshire

A fairly rough- then smooth-leaved elm known only from ancient bounder-clay woods in Cambridgeshire

Figure 6:

Jagged-leaved Elm, *Ulmus longidentata*

Shepherd's Close, Huntingdonshire

A smooth-leaved elm known from hedges and copses in Hunts and Cambs

Figure 7:

Dark-leaved Elm, *U. atrovirens*

Dyne's Hall, Halstead, Essex

In hedges and wood margins in Essex, and on fen droves in Cambridgeshire

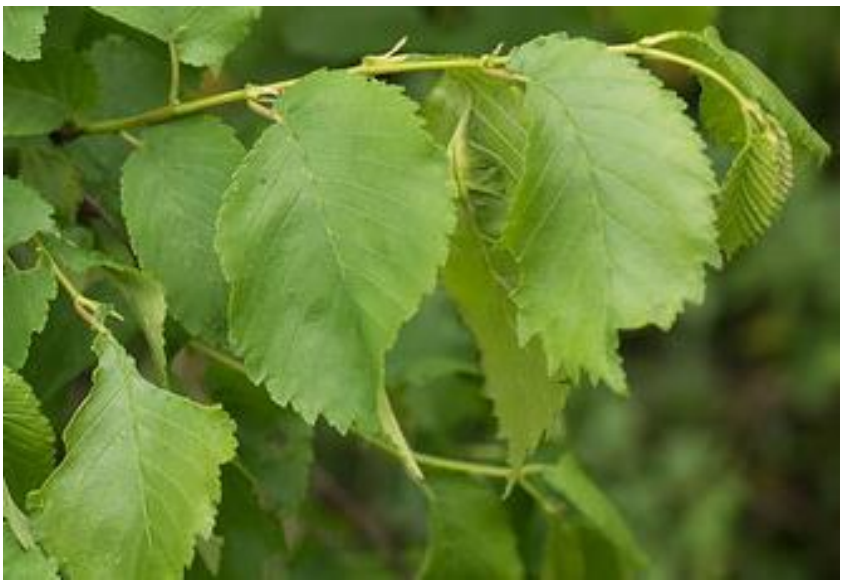

Figure 8:

Pale-leaved Elm, *Ulmus asymmetrica,*

Hockwold, Norfolk

A distinctive smooth-leaved elm found on roadsides, in hedges,and by fen droves, mainly in Norfolk, Suffolk and Cambrudgeshire

Figure 9:

Wedge-leaved Elm, *Ulmus cuneiformis,*

Shelley, Suffolk

A long, narrow, smooth-leaved elm with an umbrella-like growth form, often near streams and rivers, Suffolk, Hunts,Beds, Cambs etc

Reality of Sell & Murrell 'species'

It's early to express a view on the taxonomic status of Sell and Murrell's elms, other than to say that almost all are recognisible as defined. '62 species' is unlikely to be the 'correct' answer, and we may need full genomes and much fuller ecological and biogeographic studies before we can decide which deserve species, subspecies or varietal names. After four years, I would agree with Peter Sell that very few trees appear to be intermediate between the 62 named taxa, and I've seen only half a dozen native or naturalised elm taxa which are probably not included in the 62.

Identifying Sell & Murrell's elms

Having enjoyed getting to know the elm species described by Sell & Murrell, I have to confess that their published key uses many features which are rather subjective and difficult to interpret. It's also frustrating that the detailed descriptions do not highlight features of use in distinguishing the species, or even hint at which species might be confused with which others. Measurements of leaves are often more variable in real life than the key and descriptions allow, and quite a few species which key out solely as 'rough-' or 'smooth-leaved' can be either, often starting somewhat rough and becoming smooth by late summer.

I have produced a draft key which I hope is easier to use. Many species key out in more than one place, and there are photographs of nearly all species. It can be downloaded free from https://www.wildlifebcn.org/sites/default/files/2021-07/Complete key to native and naturalised elms.pdf I have included an expanded version of Sell & Murrell's key, with a few corrections, as not all recorders will have a copy of the book. I have also put together a much larger online collection of photographs, which is still expanding: Collection: Elms, Ulmus species, following Sell & Murrell 2018 (flickr.com)

I hope more recorders will try out the new classification, and give me feedback on the key.

I'm also still to see some of the American and Asiatic introduced species and their hybrids (omitted from Sell & Murrell) so would be very pleased to receive samples and photographs if you know reliably-named trees.

What to Sample

If you want to try identifying elms, you need mature leaves collected or photographed in the right way. Almost all works on elm identification refer to leaves on short shoots in full sun collected from June 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 shape and in key measurements such as size, petiole length, leaf-base asymmetry, and length:breadth ratio.

List of figures