

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. pseudelegantissima*, 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.

Key 1: a new key to rough-leaved elms

v. 2.3

May 2021

'Rough-leaved' elms are usually a distinct category, sometimes conspicuously and unmistakably 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 **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** 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 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 mostly obtuse and not prominent nor clearly curved forward. Without prominent 'shoulder' teeth. Leaves usually pocked with small mite galls. **4**

3a Leaves round to oval, blunt, acute or acuminate at apex, 1.2-1.9 times as long as wide. Teeth often 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 Pems. 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 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 Teeth sharply pointed, with triangular teeth jutting out, 5-7 x 5-7 x 2-4mm. Upper surface 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*

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, 1.8-2 times as long as wide, veins 11-20 on longer side, base asymmetrical by 2-8mm, petiole 3-9mm.) Native; endemic. Known only between Dane End and Sacombe, Herts.

45. Sacombe Elm *Ulmus pseudobovata*

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

9 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 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*

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*

- 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. 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. **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 Hinchbrook 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, 1.2-1.5 L:B, smaller, 7-13 x 4-8cm. **17**

16a Leaves oblanceolate 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). 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 (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. Bassingbourne, East Hatley. Hayley Wood, Bottisham and Wimblington, 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*

- 19** 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

- 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). 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*

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

Key 2: a new key to smooth-leaved elms

v. 2.3

July 2021

'Smooth-leaved' elms are usually a distinct category, based on **mature 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 |

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

5 Leaves trapezoid, 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*

- 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, 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 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. Supposedly common in hedgerows and parkland in eastern England and eastern Midlands, mainly on clay and alluvium in Essex, Suffolk, Cambs, Hunts, Northants and Leics, a few other records in E and SE. **37. SOWERBY'S ELM *Ulmus sowerbyi***
- 11a** Leaf blades 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, often very pale yellow-green. Leaves 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 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 than Sell & Murrell suggest, if indeed they are distinguishable. Sell and Armstrong appear to have found few if any specimens of *sowerbyi*. See Note 6 at the end of the keys for more information.

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-toothed, 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***

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 at Hatley St George, Cambs, and a few fen droves in north Cambs. **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.

- 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 1-5mm, 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, 1.6-2.4 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*

- 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*

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

- 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**

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 Pems. 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**

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.

- 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*

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

- 50** 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** 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***
- 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***

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 multidentate*

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 11 Plot's Elm, *U. plotii*.

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, 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, esp 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. **69**

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*

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 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 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 acutely serrate, 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 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. **72**
- 74a** Longest leaf often more than 10cm; longest asymmetry 13-18mm; longest petiole 13-16mm. Base of leaf on shorter side often sinuate. **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 Hinchbrook 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).