Winter Botany in the British Isles

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Preface

I am a strong believer in a top down approach when it comes to identification. In the context here, this means trying to compartmentalise hundreds of species into natural groups such as orders, families or genera. Not only does it allow you to not have to worry about species (for the moment), but it allows you to see evolutionary groups of plants more easily. When confronted with new species in other parts of the world, with luck they will be placed within your working knowlegde.

This guide is not intended as a replacement to the guides that already exist but it can be viewed to supplement them. By its nature of only dealing with genera the keys are necessarily shorter and less complex, which is the idea of this guide. Where possible the terminology is minimised and only the major characters of use are mentioned. This key will have very little in it that is actually new, at least in its current form; it will be a synthesis of what in the literature already exists. So for this I cannot take credit. I have relied heavily on the literature, in no particular order: Winter Botany by William Trelease (date?), The Vegetative Key to the British Flora by John Poland and Eric Clement (date?), Flora of the British Isles by Clive Stace (2012), Trees of Britain and Northern Europe by Alan Mitchell (1976), more recently Identification of trees and shrubs in winter using buds and twigs by Bernd Schulz (2018) and the Conifers Plant Crib at the BSBI (1998) by Peter Sell, http://bsbi.org/wp-content/uploads/dlm_uploads/Conifers_Crib_3.pdf. As always, where I could, terminology was simplified, though a glossary will be provided at the end.

The key to broad sections is outlined first as this is a winter botanical key, not all species will be in leaf. First thing to note is that I have separated out the conifers first, because I believe them to have such a distinct structure compared to flowering plants that it would be confusing to integrate them with the other keys. This is not the case for deciduous coniferous species however, which have been included in the main keys. When there are no leaves on a coniferous plant, it is difficult to tell that a deciduous conifer is not a flowering plant. Luckily, there are only four genera that fit into this category *Larix*, *Gingko*, *Metasequoia* and *Taxodium*.

The key should cater for any woody plant you find in the winter in the UK, save a few rare hortal escapes (though many of these are also covered), whether you are at the top of a mountain or by the sea.

My interest was sparked in the winter of 2016, mostly because I was frustrated I knew nothing about twigs! I have been compiling this on and off since then.

Introduction

Many woody plants in (especially northern) temperate climates with seasonal weather shed their leaves in the colder months of the year. On the most recent years growth, leaves fall to reveal the twig beneath. It is these structures left behind after the leaves fall that are valuable in identification. The twig itself can vary in thickness, colour, growth pattern (straight or zig-zagged) and cross sectional shape of the twig (round, oval, square).

Where the leaf falls a scar is left behind. The distribution of leaf scars on a twig (phyllotaxy) is of major importance. The presence of at least one leaf scar indicates where the node is on a twig. Leaf scars can be present in groups of three or more, in which case they are considered whorled. Secondly leaf scars can be paired, usually on opposite sides of the twig. Thirdly and most commonly, leaf scars are present singularly at a node.Leaf scars are characteristic in size, shape and the number and distribution of vascular bundles present within them.

Above the leaf scar, a bud will be present which contains meristems that will continue next years growth. They are often surrounded by scales, the size, shape and number of which are often diagnostic. Buds can be multiple at one node either next to each other (collateral), or above one another (superposed). The presence or absence of an *end* or *terminal* bud is determined either by the absence of an obvious leaf scar or by its morphological difference to lateral buds. Terminal buds are usually larger, if present. Sometimes buds can appear to be different even on the lateral buds and this is usually associated with a difference between buds that will go on to produce flowers, and those that will continue vegetative growth.

Twigs can have many and varied outgrowths on them. These vary from small, thin flexible outgrowths (hairs), which can be shaped simply, forked, tree-like, woolly, star-shaped and glandular to name a few. Hardened outgrowths of the stem are called *prickles*. In contrast, *spines* are modified leaves and therefore have a bud at the base of them (be careful, bud may be obscured!) and *thorns* are modified stems.

Where there is only one species in the genus, or the key specifically arrives at a species, the species is indicated in parentheses.

General Key

1. Leaves evergreen, needle like, scale like or both, usually hard, mostly resinous or odorous. Reproducing through cones -> Key 1 (Conifers)
2. Leaves evergreen, deciduous or absent, not needle or scale like, resinous or not. Reproducing (almost exclusively) through flowers and fruits -> 3 (Flowering plants)
    3. Leaves evergreen and parallel veined -> Key 2
    4. If leaves evergreen, then not parallel veined -> 5
3. Leaves or leaf scars >2 per node (whorled, pseudowhorled or in bundles) -> Key 3
4. Leaves or leaf scars <3 per node -> 7
    7. Leaves or leaf scars 2 per node (opposite or subopposite) -> Key 4
    8. Leaves or leaf scars 1 per node (alternate) -> Key 5

Key 1: Conifers

Conifers are seed plants without flowers, instead reproducing through cones. Only a few species are deciduous and the rest are evergreen. Most coniferous genera are highly distinct, with discrete and interesting characters.

General Key

1. Leaves whorled. Either whorled on short shoots and needle like, 3(4)-whorled around a twig or in large distant whorls -> Key 1.1
2. Leaves not whorled -> 3
    3. Leaves needle like, in bundles of 2's, 3's or 5's -> *Pinus*
    4. If leaves needle like, not bundled -> 5
3. Leaves strictly opposite, adnate, scale like -> Key 1.2
4. Leaves alternate or spiral. Adnate, scale like or not -> 7
    7. Young twigs brown or grey (by year 2). If shoot ribbed, not green -> Key 1.3
    8. Young twigs green (until year 3). Shoot ribbed by green leaf bases -> Key 1.4

Key 1.1: Leaves whorled

1. Leaves deciduous, cones persistent… *Larix*
2. Leaves evergreen -> 3
    3. Leaves in rosettes of 20-80 leaves on short shoots … *Cedrus*
    4. Leaves never on short shoots -> 5
3. Leaves many, >7, 70-120mm long in large, distant whorls … *Sciadopitys*
4. Leaves in 3's, rarely 4's -> 7
    7. Leaves blunt tipped … *Fitzroya* (*cupressoides*)
    8. Leaves sharply pointed … *Juniperus*

Key 1.2: Leaves strictly opposite, scale like (Cupressaceae)

1. Leaves broader, with large white patches below… *Thujopsis* (*dolabrata*)
2. Leaves smaller, not broad -> 3
    3. Shoots with at least some leaves in whorls of 3 (check young foliage)… *Juniperus*
    4. Leaves never 3-whorled -> 5
3. Branchlets spreading in 3 dimensions. Twigs rounded or 4-sided. Scale leaves all similar. Female cone thickly woody… *Cupressus*
4. Branchlets arranged in 1 plane, or rarely 3 dimensions. Twigs flat, or slightly flat and 4 sided. -> 7
    7. Young shoots slightly flat and nearly 4 sided. One common cultivar with branchlets in 3 dimensions… *x Cupressocyparis* (*leylandii*)
    8. Young shoots very flat, lateral scale leaves keeled -> 9
5. Scale leaves same colour on both sides, scentless foliage when crushed… *Platycladus* (*orientalis*)
6. Scale leaves lighter or whitish at margins below -> 11
    11. Female cones globular and woody, terminal shoots whip-like… *Chamaecyparis*
    12. Female cones flask shaped with scales overlapping, terminal shoots erect… *Thuja* (*plicata*)

Key 1.3: Young twigs brown or grey

1. Leaves with sucker like base, attached directly to twig… *Abies*
2. Leaves without sucker like base, attached to a projection on twig -> 3
    3. Leaves with indistinct petiole, twig very rough when leaves fallen… *Picea*
    4. Leaves with obvious petiole, bare shoots slightly rough -> 5
3. Leaves minutely serrate, buds hidden by leaves… *Tsuga*
4. Leaves entire, buds prominent… *Pseudotsuga* (*menziesii*)

Key 1.4: Young twigs green

1. Leaves with a petiole… *Taxus* (*baccata*)
2. Leaves sessile -> 3
    3. Leaves of two kinds, scale like, and linear/flat… *Sequoia* (*sempervirens*)
    4. Leaves all similar -> 5
3. Leaves >25mm long, >10mm wide, sharply spine tipped… *Araucaria* (*araucana*)
4. Leaves <25mm long -> 7
    7. Leaves spirally arranged, with free part 3-7mm… *Sequoiadendron* (*giganteum*)
    8. Leaves in 5 ranks, incurved, with free part 5-20mm… *Cryptomeria* (*japonica*)

Key 2: Leaves evergreen, parallel veined (Asparagaceae)

1. Leaves >20cm long in rosettes at apex of stem, palm-like -> 3
2. Leaves <20cm long spirally arranged on stems … *Ruscus*
3. Leaves with translucent veins … *Cordyline* (*australis*)
4. Leaves with indistinct opaque veins … *Yucca*

Key 3: Leaves or leaf scars whorled

1. Leaves evergreen -> 3
2. Leaves deciduous, leaf scars apparent -> 15
    3. Leaves pseudowhorled -> 5
    4. Leaves in true whorls -> 7
3. Matted evergreen shrub < 0.4m … *Empetrum*
4. Tall shrub to small tree >2m … *Rhododendron*
    7. Leaves 3 whorled -> 9
    8. Leaves >4 whorled -> 11
5. Young twigs glandular hairy … *Erica*
6. Young twigs not glandular hairy -> 11
    11. Leaves > 10mm wide … *Kalmia*
    12. Leaves < 1mm wide … *Erica*
7. Leaves tough >6mm wide, strongly retrorsely scabrid … *Rubia*
8. Lvs ± 1mm wide … *Erica*
    15. Leaf scars minute, many, alternate, raised on spurs on second year shoots, reproductive organs cones … *Larix*
    16. Leaf scars larger, 3 per node, not raised -> 17
9. Twigs stout, leaf scars large with ~ 12 bundle traces in an ellipse. Buds usually arranged in two large and one small … *Catalpa* (*bignonioides*)
10. Twigs slender, leaf scars smaller with 3 or fewer bundle traces -> 19
    19. Bundle trace 1, twigs mostly dead… *Fuschia*
    20. Bundle traces 3 -> 21
11. Twigs with stellate scales … *Deutzia* (better characters?)
12. Twigs hairless or with simple hairs … *Hydrangea*

Add Philadelphus?

Key 4: Leaves or leaf scars opposite

1. Plants scrambling, climbing or parasitic on trees -> Key 4.1
2. Plants not as above -> 3
    3. Plants evergreen -> Key 4.2
    4. Plants deciduous -> Key 4.3

Key 4.1: Climbing, or epiphytic plants parasitic on trees

1. Plant parasitic on tree branches with twigs repeatedly forked at the nodes -> 3
2. Plant rooted in soil -> 5
    3. Twigs sickly green … *Viscum* (*album*)
    4. Twigs brown … *Loranthus* (rare hortal)
3. Evergreen (or semi-evergreen) -> 7
4. Deciduous -> 9
    7. Leaves simple … *Lonicera*
    8. Leaves compound, climbing using coiling petioles … *Clematis*
5. Climbing by coiling petioles, persisting in winter … *Clematis*
6. Climbing by aerial roots or scrambling -> 11
    11. Anvil shaped hairs on stems, stems twining clockwise, fruits persistent with many overlapping papery bracts … *Humulus* (*lupulus*)
    12. Not as above -> 13
7. Bundle traces 1, scrambling, weakly climbing … *Jasminum* (*nudiflorum*)
8. Bundle traces >1 -> 15
    15. Bundle traces 3 … *Lonicera*
    16. Bundle traces 5 … *Schizophragma* (*hydrangoides*)

Key 4.2: Evergreen plants

1. Leaves simple and entire -> 3

2. Leaves compound or toothed -> 5
    3. Trailing, thin, wiry shrubs <20cm tall at maturity -> Key 4.2.1
    4. Tree or upright shrub -> Key 4.2.2
3. Leaves ternate… *Choisya* (*ternata*)
4. Leaves toothed -> Key 4.2.3

Key 4.2.1: Wiring, creeping, trailing shrubs

1. Leaves with stellate hairs … *Helianthemum*
2. Leaves with simple hairs or hairless -> 3
    3. Leaves translucent dotted with sunken glands, aromatic … *Thymus*
    4. Leaves not translucent dotted or aromatic -> 5
3. Leaves with revolute margins -> 7
4. Leaves with flat margins -> 11
    7. Leaves < 2mm long, petiole absent … *Calluna*
    8. Leaves >2mm long, petiole present -> 9
5. Leaves linear, rounded in cross section, 2-5mm long … *Frankenia*
6. Leaves oblong, 5-8mm long -> *Loiseleuria*
    11. Stipules absent -> 13
    12. Stipules present … *Herniaria*
7. *Veronica* bifurcate Linnaea here
8. *Veronica* bifurcate Linnaea here

Linnaea here?

Key 4.2.2: Shrubs, trees. Leaves simple

1. Leaves with clear 2 pinnate translucent veins on leaves -> 3
2. Leaves with 2 pinnate veins indistinct or absent -> 19
    3. Leaves sessile -> 3
    4. Leaves petiolate -> 9
3. Leaves <1.5cm wide and with revolute margins at maturity -> 5
4. Leaves >2cm wide, with either transulcent dotted leaves or with minute glands attached to veinlets. Leaf scars triangular, bundle trace 1, pith spongey and excavated (hollow) -> *Hypericum*
5. Leaves <4mm wide, rosemary scented. Bundle traces 3 … *Rosmarinus*
6. Leaves >4mm wide (on average), odourless. Bundle traces in a transverse line … *Kalmia*
    9. Leaves >2cm long -> 11
    10. Leaves <2cm long … *Lonicera*
7. Leaves with dendritic hairs … *Phlomis*
8. Leaves with hairs simple or absent -> 13
    13. Leaves with dense silver silky hairs below … *Olearia* (GARRYA? LEAVES GREY WOOLLY BELOW AND UNDULATE LEAF MARGINS?)

14. Leaves hairless both sides, except for vein axils below -> 15

9. Vein axils below with tufts of hairs … *Viburnum*
10. Leaves glabrous -> 17
    17. Sipules present, fused between petiole bases, young twigs ± square … *Coprosma*
    18. Stipules absent, young twigs rounded, at most angled slightly below the nodes … *Ligustrum*
11. Leaves white hairy at least below, strongly aromatic -> 21
12. Leaves never white hairy, aromatic or not -> 23
    21. Leaves hairy with long stellate hairs both sides, lavendar scented … *Lavandula*
    22. Leaves glabrous above, rosemary scented … *Rosmarinus*
13. Twigs square, leaves odorous -> 25
14. Twigs round, leaves odourless -> 29
    25. Leaves gland pitted one or either side -> 25
    26. Leaves not gland pitted -> *Buxus* (*sempervirens*)
15. Young twigs green, minutely ciliate, menthol scented … *Hyssopus*
16. Young twigs whitish, leaves long ciliate at base, sage scented … *Satureja*
    29. Leaves strongly revolute, <2mm long, sessile … *Calluna*
    30. Leaves not revolute -> 31
17. Leaves fleshy, mealy grey <6cm, not valvate when developing … *Atriplex*
18. Leaves not fleshy, valvate when developing … *Veronica* (sect Hebe)

Key 4.2.3: Shrubs, trees. Leaves toothed

1. Twigs with dendritic hairs … *Phlomis*
2. Twigs never with dendritic hairs -> 3
    3. Twigs with stellate hairs -> 5
    4. Twigs without stellate hairs -> 7
3. Stipules present, leaves white felted below … *Buddleja*
4. Stipules absent, leaves stellate hairy below … *Viburnum*
    7. Leaves < 2cm long, stems creeping and prostrate … *Linnaea*
    8. Leaves >2cm long, stems never creeping -> 9
5. Petiole with 1 vascular bundle -> 11
6. Petiole with 3 vascular bundles -> 13
    11. Twigs square … *Phygelius*
    12. Twigs round -> 15
7. Not net veined, weak 2 pinnate veins. Leaves with yellow blotches above, petiole green … *Aucuba* (*japonica*)
8. Net veined and strongly 3-pli-veined. No yellow blotches, petiole reddish … *Viburnum*
    15. Young twigs brown, each leaf tooth with a fragile claw like gland … *Euonymus*
    16. Young twigs green, leaf teeth without glands -> 17
9. Leaves cuneate at base, buds with scales … *Rhamnus*

10. Leaves rounded at base, buds naked … *Phillyrea*

Key 4.3: Deciduous plants

1. Bundle trace 1 -> Key 4.3.1
2. Bundle traces >1 -> 5
    3. Bundle traces 3 -> Key 4.3.2
    4. Bundle traces >3 -> Key 4.3.3

Key 4.3.1: Bundle trace 1

1. Twigs green … *Euonymus*
2. Twigs not green when mature -> 3
    3. Trees -> 5
    4. Shrubs -> 9
3. Terminal buds always present, buds felted brown, grey or black … *Fraxinus*
4. Terminal buds absent -> 11
    7. Pith chambered, twigs densly hairy … *Paulownia* (*tomentosa*)
    8. Pith solid, twigs red brown… *Metasequoia* (*glyptostryboides*)
5. Buds sometimes whorled in 3's… *Fuschia*
6. Buds strictly opposite -> 11
    11. Pith present, solid, whitish -> 13
    12. Twigs hollow or chambered, brownish -> 15
7. Buds mostly in pairs at twig apices, glandular ciliate with 6-7 scales … *Syringa*
8. Buds singular at twig apices, ciliate with ± 4 pairs of opposite scales … *Ligustrum*
    15. Buds >11 pairs of scales, twigs chambered to hollow between nodes … *Forsythia*
    16. Buds <4 pairs of scales, or absent, twigs hollow but never chambered -> 17
9. Leaf scars mostly torn, partly connected by transverse ridges, buds with keeled scales. Fruits white or red berries … *Symphoricarpos*
10. Leaf scars never torn, triangularly lens shaped, not partly connected by ridges, buds without scales … *Hypericum*

Key 4.3.2: Bundle traces 3

1. Transverse ridge not present between buds or leaf scars -> 3
2. Transverse ridge present between buds or leaf scars, or leaf scars abut -> 5
    3. Shoots thorny, buds with 8-10 dark brown scales, terminal buds present… *Rhamnus* (*cathartica*)
    4. Shoots not thorny, buds red with one scale visible, terminal buds absent… *Cercidiphyllum* (*japonicum*)
3. Buds hidden behind leaf scar (which is like a thin membrane)… *Philadelphus*

4. Buds exposed and obvious -> 7
    7. Buds naked -> 9
    8. Buds with scales -> 13
5. Only terminal bud naked, twigs stout… *Hydrangea*
6. All buds naked -> 11
    11. Twigs but especially buds with stellate hairs… *Viburnum*
    12. Twigs and buds without stellate hairs but with medifixed hairs… *Cornus*
7. Stipule scars large and obvious… *Staphylea*
8. Stipule scars absent or not obvious -> 15
    15. Buds with a pair of scales fused, enveloping bud, buds globose, red. Or flowering in winter, fragrant… *Viburnum*
    16. Bud scales >2, not fused, not flowering in winter -> 17
9. Pith hollow between nodes -> 19
10. Pith solid, or spongey -> 23
    19. Buds solitary, twigs green … *Leycesteria*
    20. Buds often superposed or collateral, twigs never green -> 21
11. Buds >3mm long, with buds often superposed… *Lonicera*
12. Buds <3mm long, buds often collateral… *Symphoricarpos*
    23. Twigs with 2-4 ridges decurrent from nodes. 2-valved capsules persistent … *Weigela*
    24. Twigs without ridges decurrent from nodes, fruits rarely persistent -> 25
13. Bundle traces forming a line, fruits persistent, bristly with 5 lobed calyx…*Kolkwitzia*
14. Bundle traces distinct, fruits not persistent, or if they are, not as above -> 27
    27. Pith spongey, twigs stout… *Sambucus*
    28. Pith solid, twigs more slender… *Acer*

Key 4.3.3: Bundle traces >3

1. Leaf bases obscuring leaf scars -> 3
2. Leaf scars clearly present -> 5
    3. Twigs green, hollow… *Leycesteria* (*formosana*)
    4. Twigs red or purplish, solid… *Acer* (section Palmata)
3. At least some nodes in whorls of 3 -> 7
4. Nodes strictly opposite -> 11
    7. Bundle traces >8 in an ellipse or horseshoe shape, terminal bud absent -> 9
    8. Bundle traces < 7 (usually 3-5), terminal bud present… *Hydrangea*
5. Each node with one small leaf scar, and two large… *Catalpa* (*bignonioides*)
6. Leaf scars all the same size… *Clerodendron* (*trichotomum*)
    11. Large stipule scars between leaf scars… *Staphylea* (*pinnata*)
    12. If stipule scars present, inconspicuous -> 13
7. Trees -> 15
8. Shrubs -> 21
    15. Terminal bud present, pith solid -> 17
    16. Terminal bud absent, pith chambered… *Paulownia* (*tomentosa*)

9. Bundle traces many in a closed circle, buds furry… *Fraxinus*
10. Bundle traces <9, distinct, buds not furry but may be hairy -> 19
    19. Terminal buds >15mm, leaf scars large, shield shaped… *Aesculus*
    20. Terminal buds < 15mm, leaf scars smaller, mostly crescent shaped… *Acer*
11. Terminal bud very large (15-20mm), naked… *Hydrangea*
12. Terminal bud smaller <15mm, often absent from shoots -> 23
    23. Pith wide, spongey, twigs stout … *Sambucus*
    24. Pith narrower, hard, more slender … *Acer*