

# *In Horto Feritas*

*Wildlife Gardening Notes & Thoughts*

*by*  
*C J Betts*

In Horto Feritas

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# *In Horto Feritas*

## ABOUT THE AUTHOR



Christopher Betts has been interested in natural history since boyhood. His earliest memories of wildlife are squirrels – they were red then – in the oak trees in the family garden at the edge of Wyre Forest in Worcestershire, and a rare sighting of a migrating hoopoe on the lawn. That was in 1949. In the decades since he worked first in industry in Birmingham, travelling and studying natural history in his spare time and collecting just about everything one could collect in the natural world – plants (grown in a greenhouse as well as dried & pressed), insects, fungi, nuts, shells, rocks, fossils, feathers, bones and anything curious. Entomology was and remains a particular passion – he sent mites from a sextant beetle to the Natural History Museum when he was a young teenager.

He moved into academe relatively late, in 1980, and progressed from student to graduate to lecturer and tutor. He became a Chartered Biologist and founded the Betts professional practice in 1985, dividing his time between England and France and working with his gardens and other sites, habitats and their denizens in both countries.

Other works by the same author include the *Checklist of Legally Protected British Species*; *Illustrations of the Legally Protected British Species*; *British Wild Plants in Natural Associations*; *Sentier Botanique*; *Pourquoi les gens visitent-ils Sospel?* and various short items and papers. Dr Betts is Honorary Editor of the Worcestershire Naturalists' Club and a Fellow of the British Naturalists' Association.

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## PREFACE

In these times of environmental awareness and increased interest in biodiversity, a large and growing literature on wildlife gardening and wildlife in gardens is almost inevitable, and very welcome. Add the uncountable blogs, web sites and other internet resources and it can be seen to have become a huge subject.

When I write anything about wildlife, many names of those whom I have met or known, and who have helped me over the last half century one way or another, and contributed so much to natural history, come to mind: Dr Norman Hickin, Sir Christopher Cadbury, Sir David Attenborough, Col. Bill Clayden, Col. Norman Clayden, Len Hill, Dr Peter Alma, Dr Andrew Malloch, Prof. John Rodwell, Prof. Chris Baines, Harry Green, Andrew Fraser, Fred Fincher, Sir Peter Scott, Phil Drabble, Frances Pitt, Dr David Bellamy to mention just a few whose names may be recognised by many readers, and not forgetting my parents John and Monica who did so much for nature conservation in the early days of the movement, and all those of the Worcestershire Naturalists' Club and British Naturalists' Association. It is hard to express sufficient thanks to all these people who were so kind, courteous and generous with their knowledge and time.

Well aware that it is nigh-on impossible to avoid regurgitating at least some material, I have tried to offer a different "take" on the subject of wildlife gardening which I hope isn't boring, confusing or, perish the thought, patronising. Gardens and wildlife are addictive and enduring passions as all who enjoy them know, so this is an attempt to capitalise on that and emphasise an approach that encourages a population and community (in the ecological sense) mindset and application.

That is not to say that I have ignored the encouragement, recording, management and enjoyment of individual species, far from it, but the rewards of applying a little phytosociology, for example, can make the emerging whole greater than the sum of its botanical parts. This book is a rather unstructured discourse about wildlife gardening, not an instruction manual on how to make one, although I have included a few tips here and there and plenty of planting suggestions. The views I have expressed are mine and not necessarily those of the Practice. I hope you enjoy it.

# *In Horto Feritas*

## CONTENTS

For those in a hurry.....	5
<b>Chapter 1</b> Taking Stock .....	7
Habitats map.....	7
Biological recording in the garden.....	9
What to record .....	13
Identification .....	13
<b>Chapter 2</b> Collecting Specimens .....	16
Alien invaders.....	19
<b>Chapter 3</b> The Garden as an Ecosystem .....	22
<b>Chapter 4</b> The House and Other Structures.....	24
Outhouses, greenhouse and garage .....	31
Green roofs, living walls and the like .....	34
<b>Chapter 5</b> Lawns and Longer Grass.....	39
Lawns .....	39
Longer grass.....	40
Calcifuge grasslands .....	41
Mesotrophic grasslands .....	42
Calcicolous grasslands .....	43
General note on grassland establishment .....	45
Cutting regimes for grass areas .....	45
<b>Chapter 6</b> Flower Beds .....	48
Bees .....	50
Scent .....	51
<b>Chapter 7</b> The Vegetable and Fruit Garden.....	53
<b>Chapter 8</b> Shrubs, Shrubberies and Hedgerows .....	56
Rose beds.....	56
Shrubs as focal points and in mixed shrubberies .....	58
Hedgerows.....	60
<b>Chapter 9</b> Trees – Ornamental and Fruit .....	65
Sex and death.....	67
Shade.....	68
<b>Chapter 10</b> Rockeries, walls and paving.....	71
Animals under stones .....	79
<b>Chapter 11</b> Pools, ponds and water (marsh & bog).....	80
<b>Chapter 12</b> Utility areas – compost heap, weedy places & habitat corners ...	86
Glossary and abbreviations .....	89
APPENDIX I: Classification by molecular analysis for non-specialists .....	91
APPENDIX II: Tips on equipment, curating and caring for collections.....	96
Equipment.....	96
Labelling.....	105
APPENDIX III: Wildlife gardening plants – selected lists .....	107
APPENDIX IV: Wildlife homes & feeders .....	129
Bird boxes .....	129
Bird tables feeders and baths .....	130
Bat boxes .....	131
Terrestrial mammal boxes .....	133
Amphibian “houses” .....	134
Invertebrate “houses” .....	134
For your notes .....	137
Index for Main Text .....	146

# *In Horto Feritas*

## *In Horto Feritas*

FOR THOSE IN A HURRY



## POTTED WILDLIFE GARDENING

Take an “ecosystem approach” and think of the whole garden as a place for wildlife, not just a designated area within it.

If you hate the idea of being a slave to your garden, recall William Kent’s dictum that nature abhors a straight line and know that a little less formality, not too much pruning and tidying, a few neglected corners and some dead wood left to rot undisturbed are of great value in increasing biodiversity.

Go for maximum variety – of plants, design, structures and materials. This creates a multitude of different habitats and with them a rich ecology.

Keep records of what you see, and learn more about taxa that interest you – birds, spiders or hoverflies, say. You’ll be amazed at how many species visit (8,000 to 10,000 would not be unusual if you counted all the different invertebrates!) and are valuable for conservation organisations like the Biological Record Centre ([www.brc.ac.uk/](http://www.brc.ac.uk/)), too.

Be bountiful in your provision of bird, bat and bug boxes.

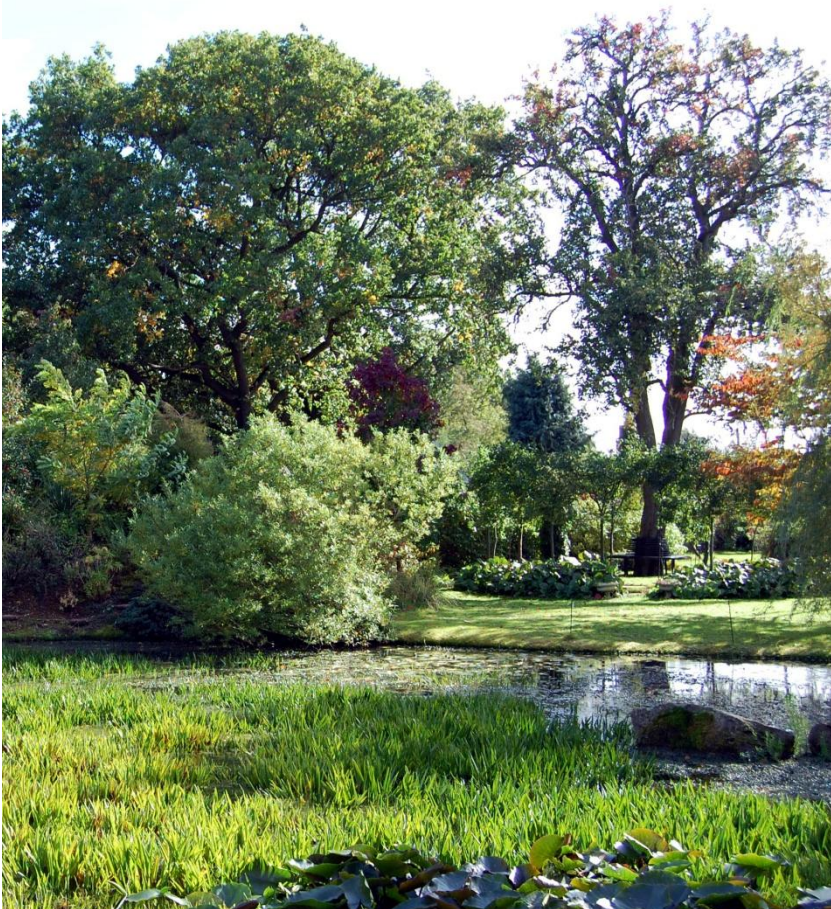
“Connected” gardens are better – use hedges and other plantings, to create “green corridors” with adjacent land.

Don’t try too hard to re-create wild habitats – just garden with wildlife in mind. By all means include as many of the less invasive and more attractive of our native plants as you can, but above all grow what you want to grow and what pleases you. Don’t waste time on plants that sulk.

If you only do one thing for wildlife, install a pond!

Remember – in overcrowded Britain, your garden is a precious resource for wildlife.

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The author's garden in Worcestershire in late summer.

# *In Horto Feritas*

## CHAPTER 1 TAKING STOCK

*“I love it when a plan comes together.”*

(With apologies to George Peppard.)

People groan at the mention of making plans, but don't be put off: this isn't a cartography book. All you need to start with is a baseline – a benchmark of what there is in your garden against which you can note changes as time passes. There are two broad elements to this: a map of the habitats and a system for recording the plants and animals that comprise them or visit them. If you do want to make a beautiful and elaborate plan, though, there is plenty of scope for the artist.

### Habitats map

You probably already have a base plan of your house and garden in your deeds but, if not, a rough sketch more-or-less to scale will do. You could use one of the on-line satellite view or mapping tools to help. On this base map, mark up all the different features and colour code the different habitats. You can use a known protocol such as “Phase 1<sup>1</sup>” which has some good techniques, but you will have to modify it to cope well with gardens. You can draw it by hand but a computer is far more efficient, gives a better finish and the result is much easier to update and embellish, allowing you to link it to species lists, observations and projects, not to mention sharing it with family and friends.

The illustration below is an example of what a very basic plan, drawn using a computer and roughly following Phase 1 codes, might look like. By using a digital camera and loading it into a computer graphics program as a drawing base, you can obtain a classier result. Then, the taking of a series of photographs from the same viewpoint through the seasons and over the years builds up a valuable and interesting record, especially with added observational notes. Indeed, the use of digital photography in the wildlife garden is one of the most powerful tools available for recording information. Don't forget to date plans and the notes associated with them over time.

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<sup>1</sup> *Handbook for Phase 1 habitat survey - a technique for environmental audit*, ISBN 0 86139 636 7 available from on-line bookshops such as Amazon.

# In Horto Feritas



## Target Notes to plan as at May 2012

1. Lawn with three silver birch trees, spring bulbs under, floribunda rose edging.
2. Lawn with floribunda rose edging, ornamental paper-bark maple in corner with snowdrops under. Hedgehog "house" in corner.
3. Climbers (ivy, clematis, *Campsis* (south wall) and Virginia creeper growing from beds with annuals). House martins' nests on eastern elevation. Bats (think they are common pipistrelle) seen entering under gap in roof tiles in summer.
4. Raised bed with vegetables and herbs.
5. Garden shed with sedums forming green roof (self-sown on flat concrete roof panels). Bird table, bird-bath and seed feeder here in paved corner.
6. Native garden hedge (hawthorn plus trees – holly, pedunculate oak, rowan, ash). Bird boxes placed on three of the trees – occupied by blue tit; blackbird and chaffinch nests in hedge. Ornamental shrubs in front of hedge providing good cover (azaleas, rhododendron, Japanese maple, barberry, *Viburnum bodnantense* (winter nectar), copper-leaved hazel).
7. Main lawn area – no longer treated with selective herbicides so becoming more species-rich (daisies, plantains, speedwell, clovers) and cut higher so clovers and

## *In Horto Feritas*

daisies flower; two laburnums near house, specimen ornamental flowering/fruiting crab apple in centre.

8. Low flowering shrubs interspersed with a few herbaceous perennials (lupins, Michaelmas daisies, poppies, delphiniums) and central rockery – good saxicolous habitat for mosses and some lichens as well as the alpine plants. Insect “shelters” placed among rocks – slow-worm seen here (no slug bait used). Nectar plants in this area include *Sedum spectabile*, *Iberis*, *Primula* and *Centranthus*.

9. Ornamental pond – no fish as taken by herons. Now holds breeding smooth newts and common frogs amongst *Typha minima*, miniature water-lilies and brooklime which newts use to wrap their eggs. Dragonflies and damselflies seen often. This area is very rewarding to watch quietly for visiting birds and insects. Paving surround has ants’ nests under and lichens/mosses growing on undisturbed edges (to be identified). Corner tree is small weeping flowering cherry.

10. Less formal area of longer grass (remnant of old field with bulbs at edge (daffodils) and small fruit trees (apples, pears, damsons/plums), and managed as a mini hay meadow (sweet vernal-grass, crested dog’s-tail, red fescue, common bent, Yorkshire-fog, yellow oat-grass, common knapweed, common bird’s-foot-trefoil, oxeye daisy, meadow vetchling, lady’s bedstraw, autumn hawkbit, meadow buttercup, cat’s-ear, and the hemi-parasitic yellow rattle).

11. Far boundary hedge – old county boundary remnant with hawthorn, oak, hazel, blackthorn, Midland hawthorn, ash, honeysuckle, dog rose, wild plum and holly – trees are pedunculate oak, ash, holly and yew.

12. Compost heap. Grass snake eggs found here in grass cuttings last year.

### Biological recording in the garden

There has been a strong revival of the Victorian passion for recording species in the last few years, with Biological Record Centres (BRCs) springing up in almost every county and connected to a national on-line database that anyone can access. This is linked to, and increasingly harmonised with, other biological recording repositories such as the National Biodiversity Network ([data.nbn.org.uk/](http://data.nbn.org.uk/)) and the European Network for Biodiversity Information, Species 2000 Europa, etc. By visiting the Natural History Museum’s “postcode plants” facility in their nature on-line pages you can even find out what wild plants have been recorded in your area ([www.nhm.ac.uk/nature-online/](http://www.nhm.ac.uk/nature-online/)).

There are several biological recording programs available at varying prices (RECORDER, ADITSITE, MAPINFO, etc.) and efforts have been made, not always successfully, to make them platform-compatible and allow easy data sharing. Many of these programs need considerable biological and IT knowledge so, unless you are already something of

## *In Horto Feritas*

a taxonomist and computer wizard, it is better to begin by simply making lists, either in a notebook (nothing wrong with that!) or on a computer using a database program, or perhaps just a word processor or spreadsheet. There are several open-source, free ones available.

I have devised simple recording forms for our nature reserves which can readily be adapted to gardens, as explained below. Good baseline data are essential against which to measure changes and improvements in biodiversity as a result of your wildlife gardening efforts. It is also a rewarding and relatively undemanding way to learn identification and recording skills or hone existing ones. Simple lists are a good start, but real synergistic value comes when you add dates, habitat notes, photos and other observations. Don't be daunted by all the scientific names and jargon – something it is worth recalling is that most top flight naturalists are self-taught. Always remember to pass your records to your local BRC.

The taxonomic groups you may find are listed below, excluding a few microscopic ones<sup>2</sup>. You will probably want to start with just a few of the more common ones, or specialise in one group such as birds:

mammals  
birds  
amphibians  
reptiles  
fish (if you have a stream or pond)  
molluscs (slugs and snails)  
crustaceans (woodlice and many aquatic genera)  
arachnids (spiders, harvestmen, mites, *etc.*)  
myriapods (millipedes *etc.*)  
insects – COLLEMBOLA (springtails), THYSANURA (bristletails),  
EPHEMEROPTERA (mayflies), ODONATA (dragonflies), DICTYOPTERA

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<sup>2</sup> This is in no way meant to belittle (sorry, bad pun) the extraordinary richness and importance of micro-organisms in the garden's web of life. Bacteria, for example, are arguably by far the most important taxon on earth, and the most numerous. We could not live without them and relatively few are harmful despite popular belief, although some of those that are can be very nasty indeed. Microscopic examination of a soil sample or drop of water from a pond will reveal a teeming assemblage of monerans, protists, micro-algae and animalcules of many kinds but is rather beyond the intended scope of this book.

## *In Horto Feritas*

(cockroaches), PLECOPTERA (stoneflies), ORTHOPTERA (grasshoppers, crickets), DERMAPTERA (earwigs), PSOCOPTERA (barkflies, book lice), PHTHIRAPTERA (lice), HEMIPTERA (bugs), NEUROPTERA (lacewings), COLEOPTERA (beetles), MECOPTERA (scorpionflies), TRICHOPTERA (caddisflies), LEPIDOPTERA (butterflies & moths), DIPTERA (true flies), HYMENOPTERA (bees & wasps)  
annelids (earthworms, etc.)  
nematodes (roundworms)  
flatworms  
flowering plants  
conifers  
club mosses  
horsetails  
ferns  
liverworts  
mosses  
fungi (the larger species) and lichens  
algae – including stoneworts (and the blue-greens or CYANOBACTERIA which are a separate phylum).

Making a habit of adding as much information as possible to your records – it makes them much more interesting and useful to you, your family, friends and data repositories like the BRC. For all records, photographs and specimens (specimens are discussed in Chapter 2), try to include:

- 7 your name or that of whoever made the record;
- 7 the location in your garden where the observation was made or the specimen collected – you can use a map or GPS – and the date;
- 7 an indication of abundance (actual number or whether occasional, frequent or abundant);
- 7 a brief description of habitat and substratum (e.g. "on bark on north side of ash tree trunk");
- 7 a photograph or sketch; and
- 7 a sound recording if your record is of a bat, bird, cricket, etc.

On the following page are snips from a simple recording table template you could employ. If you are doing this on a computer, you can insert hyperlinks to photos, illustrations, sound files and extended notes elsewhere on your system which is very useful, but you can make it as simple or sophisticated as you like.



## *In Horto Feritas*

### What to record

Most people find that particular groups of organisms attract them, so go for what you enjoy – it might be garden birds, the group generally regarded as the most popular, or plants, which are my personal favourite both wild and cultivated, dragonflies visiting your pond (good eyesight essential!), or small mammals such as bats or hedgehogs. All of these will be rewarding, satisfaction guaranteed. There are many cases of people discovering rare or even new species in their gardens, insects particularly.



Birds have long been a popular subject for recording in gardens and the Victorians produced charming studies of them such as these of wrens and a male blackbird in the author's collection.

### Identification

There is a plethora of identification aids and keys to help you and a local wildlife group is worth joining to meet friendly experts who will be only too pleased to share their knowledge. Start with a basic book on, say, birds, mammals, larger insects or plants and take it from there as you become more competent and confident.

## *In Horto Feritas*

Do try to become familiar with the scientific names. Classification helps us order and arrange organisms in ways that make the whole subject more accessible and easier to grasp. The superb taxonomic systems we habitually use have been devised by great minds to make life easier to classify and avoid confusion. The internationally accepted binomial Linnaean system gives organisms a two-part name comprising genus and species, always written in italics and with the first part, the genus, having an upper case initial letter, and the species following never with one – e.g. the daisies in your lawn are *Bellis perennis*, the species *perennis* (Latin for perennial as you probably guessed) belonging to the genus *Bellis*. There is rather more to it than that, but becoming familiar with genera and species is a good way to start. Other ranks and conventions – phyla, classes, orders, families, subspecies and authors, *etc.*, not to mention cladistics and phylogenetics<sup>3</sup> – can come later!

Those who did classics at school, sadly an endangered species themselves these days, will have the advantage of understanding what many of the scientific names mean which does make them much easier to remember. I always encourage people to obtain a Latin dictionary if they can – or you can easily download one of the many Latin:English translation tools to your computer's desktop.

Greek is a little more difficult as you need to know the ancient Greek alphabet, but well worth the perseverance as many words are Greek-derived, including ecology (οἶκος = any place in which to live, and λόγος, here taken in its meaning of a reasoned account or study), ornithology (ὄρνις), geology (γῆ), arachnid (ἀράχνης), myriapod (μύριοις, ποῦς) and so on. Again, computers have made this so much easier than when I was at school – most word processing programs have the Greek alphabet characters, many of which you will already know from science and maths, and the internet offers instant translation.

Drawings are often more helpful in identification than photographs. This is because they, or at least the better ones, pick out the important characteristics that define the species or variety concerned. It may be a detail of a flower's stigmata or the markings of a hoverfly's abdomen, but a good drawing is able to ignore the

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<sup>3</sup> See Appendix I for a short explanation.

## *In Horto Feritas*

more general features common to all the similar species and highlight those that are characteristic of the one under consideration.

Sketching organisms yourself can help with identification, too, as careful observation of the minutiae of the shape and structure of your subject imposes a discipline of accurate recording of determinant features. For example, the early drawings by J.E. Smith of 1807 below show clearly the features of the long-beaked achene of goat's beard (left) and its pappus with spidery side-hairs, and the ligulate ray florets of dandelion with stamens and pistil and (far right) daisy with only a pistil.



# *In Horto Feritas*

## CHAPTER 2 COLLECTING SPECIMENS

*“... not a single bottle or tin in our house was thrown out, they all made containers of one sort or another for my collection.”*

(Gerald Durrell, *The Amateur Naturalist*.)

One of the more fulfilling and enthralling aspects of wildlife gardening is that it provides one with opportunities for indulgence in that near universal human passion – collecting. It is to be regretted that many people now frown upon such activities in a misplaced view that collecting almost any natural history specimens and curiosities is bad. Of course, some irresponsible or downright illegal collecting must be proscribed – birds’ eggs, rare butterflies, the wanton killing of any animate life form. Nor am I advocating compulsive hoarding, although people undoubtedly can and do become obsessive in amassing objects relating to their chosen subject. A few words on the topic would seem appropriate before progressing to the core subject of this book.

*Sensu lato*, your garden is yours and, within reason and the law, you can do in it whatever takes your fancy. Nonetheless, living in this world is a privilege and it should be treated with courtesy, responsibility and respect, one’s garden and the species that come to live there included, even if some are unwelcome and have to be discouraged.

Many individuals and organisations have produced Codes of Practice for natural history collecting, and for horticultural best practice such as in the use of herbicides and pesticides, but I am not aware of one that has wildlife gardening as its environmental focus. Moreover, the published Codes I have seen tend to be rather patronising and often unscientific so, in my suggested rules for collecting on one’s own patch, I have tried to assemble a relevant, responsible, science-based and pragmatic guide for activities *in horto*. This is a guide, not a rigid rule book, and not ordered in any particular way. Please use common sense in its interpretation and application.



Keep within the law and don’t collect legally protected species. Even to keep parts of certain strictly protected ones, you need

## *In Horto Feritas*

a licence. Not all are rare: any bat and the great crested newt are examples you may find in your garden.

- Virtually all birds are protected. Never collect birds' eggs (except perhaps pieces of discarded shells on the ground that have been predated or ejected from a nest after hatching) and never take any birds' nests until you are certain they are no longer in use. Old nests, after breeding has finished in autumn, can be a fascinating source of invertebrates living on the debris, though.
- Avoid collecting live uncommon or rare species of any kind.
- Remember it is illegal to introduce exotic species to the wild – dispose of garden waste containing propagules by composting or burning, or in an approved repository.
- If you are taking voucher specimens of invertebrates, collect the smallest possible number needed for identification. Be aware that identification may be possible without killing the specimens. If you are interested in a particular species or related group, avoid taking them from the same place in the garden year after year. For preference, always try to breed invertebrates and release some back into your garden (not elsewhere) after preserving those you need in your permanent collection. Do your research first so you know how to feed, care for and breed them.
- Protect micro-habitats. If you are collecting under paving stones or logs in your garden, replace them carefully and don't disturb them too often.
- Predators and parasites are part of the food web and the inter-related richness of the ecosystem. Unless they have proven pest status and are irreparably destroying your gardening efforts in your greenhouse, flower beds or vegetable patch, don't destroy them.
- If you are setting traps, visit them regularly and often; arrange them so they do not catch non-target species. Live traps are preferable so you can release your catch after photographing or study. Sticky traps, such as "sugaring" for moths may snare other invertebrates. Conduct all trapping responsibly.
- If using baits to lure species for study or for photography *in situ*, be aware that the animals you attract may become used to having the food and may suffer if you suddenly remove it. If you keep animals for breeding or study for a time, look after them

## *In Horto Feritas*

well and give them correct food, clean water, the right temperature and suitable bedding/shelter. Release them where you found them in appropriate habitat when the time comes.

- For leaves and flowers, avoid leaving ragged severance snags – use scissors, a sharp knife or secateurs.
- Always be courteous to your neighbours and don't collect in others' gardens without consent.

Here are some ideas for what you might collect in your garden that will not cause any harm or distress.

- Rocks and fossils – it is surprising how many interesting specimens can be found in gravel, paving stones and the like;
- Soil – most gardens have considerable variations in soil and edaphic fauna across the plot;
- Mouldings of animal tracks using plaster of Paris or one of the new moulding materials sold in hobby shops;
- Bones, feathers, snail shells, seeds, cones, nuts (mice-gnawed), sloughed skins, hair, galls;
- Sound recordings (birds, bats, crickets);
- Live fish, water plants, aquatic invertebrates for an aquarium;
- Plants for a greenhouse, Wardian case or carboy/bottle;
- Dragonfly and other insect exuviae/empty pupae;
- Fungi (dried or spore prints), lichens;
- Plants and flowers generally, for pressing/drying;
- Wood sections and insect galleries;



Fossils from drive gravel (limestone).



Fox skull after preparation and cleaning.



Saproxylic invertebrate galleries in section of dead pear tree.

## *In Horto Feritas*

- Invertebrates for breeding such as moths, butterflies, ants, beetles, snails, spiders;
- With due care for hygiene: corpses and faeces of all kinds (but remember they are food for scavengers and decomposers);
- Old nests (birds, mammals, wasps, hornets);
- Microscopic specimens on slides.

See Appendix II for a few tips on caring for what you collect and the equipment you may need.

### Alien invaders

From time to time, well more and more frequently it seems to me, scare stories appear in the media about this and that exotic invader to our shores that is going to destroy gardens and the countryside as we know them. Such reports, even when they do not exaggerate the impacts they predict, display a fundamental lack of understanding of ecology (see next chapter) and the way the world works. Of course, mankind has been responsible for the destruction or serious impoverishment of many biomes, from rainforest to tundra, marshes to the open sea. There is no doubt at all that our species is shamefully culpable for the accelerated rate of extinction of much other life on the planet and that we have exceeded a sensible carrying capacity in our teeming and ever-increasing population. These are earth-wide problems that we would do well to address but are utterly hopeless at so doing. There is also no doubt that some kind of ecological balance will be forced upon us as resources and planetary environmental support systems falter. It will not be pleasant, but there is far too much insipience in high places for wisdom to prevail.

Back at garden scale with our feet on the ground, colonisation by a few exotic species, introduced to the UK or arriving here by serendipity, pales into insignificance. As vectors, with our global travel and transport, we are unsurpassed. All manner of animals, plants and microbes hitch a lift in, on or because of us. Whether it be sudden oak death, lily beetle, vine weevil, New Zealand

## *In Horto Feritas*

flatworm, fuchsia gall mite, or Japanese knotweed, it is highly doubtful that we can, or rather will, do very much about it. Our fauna and flora will continue to be insulted by waves of colonisers and will either adapt or die. That is the nature of things.



Japanese knotweed

Yes, we can and should do as much as possible to preserve biological diversity and stem the tide of devastations of species we love but we are not good at it. Elms have succumbed, so have red squirrels and Atlantic stream crayfish, but habitat change or loss has been and is far more damaging than alien species and foreign pathogens. In post agricultural revolution Britain, we are left with the situation that, over much of the land, our gardens (full of exotic species, please note) are almost the sole surviving significant habitat for the residual populations of huge numbers of wild taxa.

Wilful introduction of exotic species to the wild is against the law but deliberate action of that kind is rare. It is escapes, autonomous colonisation and the incidental spread of propagules and micro-organisms that are collectively significant. This all boils down to the fact that colonising aliens are inevitable. Most will be harmless or will not establish, but a few will cause gardeners to shake heads and wring hands; even fewer will be able to be controlled as most garden chemicals have been withdrawn by EU regulators (another *nid de guêpes* and I do not intend to disturb it here).

The advice must be: keep a watchful eye, don't dispose of live garden waste carelessly, monitor the responsible gardening media such as the Royal Horticultural Society's web pages and publications, and accept the ecological and political dynamics of our modern world philosophically when it comes to gardens. If you feel

## *In Horto Feritas*

passionately about habitat destruction, as I do, focus your energies and donations on science-based, serious conservation organisations. Lobby politicians as hard as you can by all means, but few have any understanding of life sciences and those that do are mostly ignored, so be prepared for disappointment and a long, hard battle.



The scarlet lily beetle *Lilioceris lili* (Scopoli 1763) may be pretty but has become a significant pest. These are two of several in a colony that entirely destroyed an old and valued clump of *Lilium henryi* in our garden.

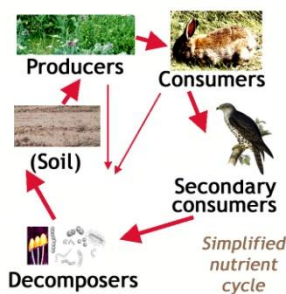
# *In Horto Feritas*

## CHAPTER 3 THE GARDEN AS AN ECOSYSTEM

*So, naturalists observe, a flea  
Has smaller fleas that on him prey;  
And these have smaller still to bite 'em;  
And so proceed ad infinitum.*

(Jonathan Swift: *Poetry, a Rhapsody*, 1733.)

There are many definitions of ecology, my personal favourite being that of American ecologist E.P. Odum who succinctly called it “*the study of the structure and function of nature*”. An ecological system includes not just the plants and animals in a defined unit such as a garden, but all the inanimate elements with which the organisms interact and the processes of life – eating, preying (with an e, crazy creationists please note!), being preyed upon, breeding, dying, decomposing and what have you. It is helpful to think of a garden as such a dynamic because everything interacts with everything else and nothing has a free lunch. You may only be interested in, say, butterflies, but they, like everything else, need sustenance, shelter, the ability to reproduce, and a means of eliminating waste. Any species unable to obtain these will, at best, only be a fleeting visitor; but provide its larval food-plant, other flowers with nectar, somewhere to pupate and space for courtship and mating, and that species will be likely to make its home with you for generations. But it will also almost certainly become part of a food chain, especially if successful and present in some numbers.

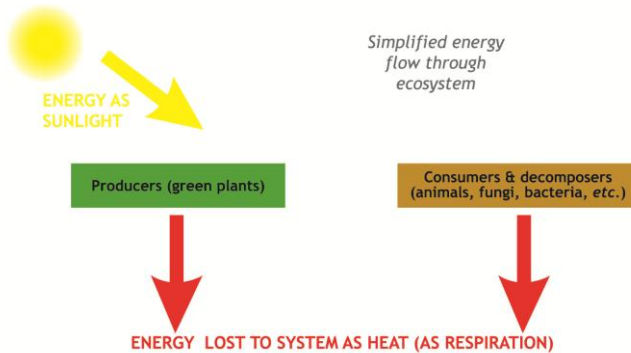


Food chains and food webs are as important and fundamental in the garden as anywhere else. Plants, as the “producers” (because they produce energy from sunlight through photosynthesis) are the basis of most food chains. The “consumers” are the majority of the rest - consuming the plants and often each other. Thus the nutrients cycle around

the system, helped by the decomposers – the fungi and various micro-organisms that break down the complex chemicals of life and its wastes into simpler forms that the plants can take up again. On

## *In Horto Feritas*

the other hand, energy flows through the ecosystem and out – from the sun through the biological and physical elements of the planet in various forms and ultimately away as heat – even if trapped for too long just now in a gas-bounded greenhouse formed, *inter alia*, by our extensively burning fossil fuels and intensively farming flatulent livestock. I am over-simplifying, greatly – ecology and ecosystems are bewilderingly complex, commonly counterintuitive and exist at an enormous range of scales in virtually endless variety, from the biome that is the gut of an ant to a whole ocean or planet. And I haven't even touched upon genetics and evolution which the religiously zealous so misguidedly and insidiously misrepresent.



Although you may be forgiven for having forgotten, this is a book about wildlife gardening and, having posted a flag in your mind about the ecological context of a garden in this short chapter, it is time to move on from the aperitif to the main course.

Your garden will comprise various elements and the following chapters consider these, what you might find in them, how you can study and observe them, and how you can enhance them for wildlife and, I hope, for your own pleasure, intellectual reward and physical benefit.

# *In Horto Feritas*

## CHAPTER 4 THE HOUSE AND OTHER STRUCTURES

*“Many small organisms now live mainly or entirely inside human dwellings and buildings.”*

(Denis Owen, *The Natural History of Britain & Northern Europe— Towns and Gardens.*)

It may seem strange to devote space to buildings in a book about wildlife gardening, but they are, after all, where we spend most of our time and an integral part of the plot.

My friend, prolific writer and boyhood mentor in natural history, the late entomologist Dr Norman Hickin, wrote a disturbingly fascinating book all about insect pests in the home<sup>4</sup>. It made me realise that houses, not to mention our bodies, are the habitat of a multiplicity of organisms. Norman listed more than seventy-five species – silverfish, cockroaches, crickets, earwigs, bed bugs (these were rare then, now spreading again), moths, lacewings, beetles, wasps, ants, flies, fleas, woodlice, centipedes, lice and ticks, and he was just talking about invertebrates. We can add bats, rodents of various kinds, several species of birds such as house sparrows and hirundinids, perhaps toads and the occasional frog in the conservatory or greenhouse, and several plants – ivy up walls, mosses on roofs and other exposed surfaces, occasional liverworts in moist places, algae and, in a group of their own, many saxicolous lichens. In the microscopic world, there are a host of moulds and microbes, too. Any one of these groups could, and in many cases is, the subject of a lifetime’s research and study. For the Wildlife Gardener, though, it will be just a few that are of particular interest so I will restrict myself to a few words about those with obvious garden links.



Bats will enter roofs through gaps in tiles

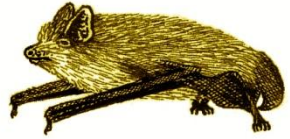
Bats are interesting because they forage in the garden and, being insectivorous, control many flying pests even if their feeding is indiscriminate. They are on the wing from early spring when the weather warms up until

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<sup>4</sup> Hickin, N.E. (1964). *Household Insect Pests*. Hutchinson & Co., London, UK.

## *In Horto Feritas*

the cool days of autumn, sometimes emerging in winter for a quick snack during mild weather. They are nocturnal and can best be seen emerging at dusk or returning to roosts in the house at dawn, or watch for them swooping for prey over your garden pond or along a hedgerow. Their calls are too high-pitched for most human ears, although some children can hear them, but are easily detected and recorded on one of the many types of bat detector now available commercially. The recorders can be linked to your laptop and results displayed graphically which helps identification, so you can build up a useful collection over time. All bats have strict legal protection, so the rule is: observe but don't disturb. Even if you find a dead one, you will need a licence to keep it in a collection (available from English, Welsh and Scottish Conservation Agencies – details can be found on-line). Species you are most likely to encounter in your garden are the pipistrelles (common and soprano *Pipistrellus pipistrellus* and *P. pygmaeus*, brown long-eared *Plecotus auritus* and myotis such as Natterer's bat *Myotis nattereri*, especially if you are in an area with much woodland).



Soprano pipistrelle *Pipistrellus pygmaeus* drawn by Leone Betts.



There are a few birds that use houses for nesting, most commonly the swallow *Hirundo rustica* and house martin *Delichon urbicum*. Areas and houses differ greatly in their attraction to these species. The house sparrow *Passer domesticus* used to be a common sight nesting, rather scruffily, on buildings when I was a boy. Today they have become uncommon in many parts, perhaps because of changing farming practice that has cut their food availability (weed and crop seeds). If you want to encourage these happy, sociable little birds that nest colonially under roof tiles or in other recesses of buildings, you can find specially designed nest boxes on-line, but you will also

## *In Horto Feritas*

need to ensure there is a year-round food supply at hand, or rather beak (seeds of weeds and other plants, insects and grubs, bread and scraps) by leaving seeding plants for them and a suitably stocked bird table (see later).

The jackdaw *Corvus monedula* often nests in holes and cavities in older houses, and they love disused chimneys. Modern homes present few opportunities for them, but a large nest box or two (there are many on the market) sited high up on the walls would be worth a try. Like all corvids, they are intelligent birds, and they are real characters, gregarious and vociferous. I love to have them around a house and garden; once there, they seem to become permanently attached to a property strutting about on the lawn as if they own the place.

The starling *Sturnus vulgaris* will nest on buildings, untidily, and in nest boxes on the walls. This is another once very common species that has declined in Britain. Some, but I am definitely not amongst them, find these birds rather noisy and aggressive – close up, their coloration is extraordinarily beautiful and they can become quite tame.

The largest house-nesting bird in Britain is, or rather was, the white stork *Ciconia ciconia* but, although one does not have to venture far into continental Europe to see these magnificent carnivorous birds—it eats small mammals, fish and amphibians—it is now only a rare vagrant in the UK. Perhaps one day it will return to breed in numbers.

Climbers, creepers and wall shrubs around the house are a must and they present opportunities to many garden birds to nest, blackbird, *Turdus merula*, mistle thrush *T. viscivorus*, song thrush *T. philomelos*, robin *Erithacus*



Song thrush *Turdus philomelos*

## *In Horto Feritas*

*rubecula*, chaffinch *Fringilla coelebs*, wren *Troglodytes troglodytes* and spotted flycatcher *Muscicapa striata* amongst them. Good wall plants for houses that self-cling, give suitable cover for birds to roost and nest, and offer a home for many invertebrates, include ivy *Hedera helix* and its many varieties, Virginia creeper *Parthenocissus quinquefolia*, trumpet of Jericho *Campsis radicans* and climbing hydrangeas *Hydrangea anomala* ssp. *petiolaris*. All these can become very large so need management.



The deliciously scented native twiner honeysuckle *Lonicera periclymenum*.

Twiners and scramblers with wildlife value include the many wisterias, several clematis such as the scented *C. flammula*, *C. integrifolia*, *C. montana* and *C. armandii* (not terribly hardy), honeysuckles (especially the scented native *Lonicera periclymenum* and its varieties), star jasmine *Trachelospermum jasminoides* and summer jasmine *Jasminum*

*officinale*. Many, many magnificent roses are excellent “climbers”, too, offering pollen, nectar and hips.

Almost all shrubs and small trees can be grown in a bed against house walls – try to choose ones with nectar, berries and good cover. Appendix III will help you select but do pick the right aspect and soil conditions, avoiding any with aggressive roots. There are plants for virtually every situation and, as walls give added protection, you can experiment with some of the choicer ones that are less than fully hardy.

Window boxes and hanging baskets are also valuable to wildlife as well as adding to the charm of a dwelling; no opportunity should be missed to use them. There is a vast range of plants that will grow well in them and the traditional grumble about the chore of watering them has largely been overcome through clever self-

## *In Horto Feritas*

watering designs or the use of water-retaining gel or crystals added to the potting compost. These containers are an ideal place to grow colourful annuals with a long flowering period that will draw bees and other insects to them – try pot marigold, *Nasturtium*, cornflower, *Clarkia*, Virginian stock, candytuft, corncockle, small scented *Nicotiana*, love-in-a-mist, busy-Lizzie, *Petunia* and poached egg plant, extending the season with pansies, pinks, primroses and bulbs. Outside the kitchen window (or door), a box in which to grow herbs will yield culinary, entomological and ornithological<sup>5</sup> benefits. Leave some shoots unpicked so that they flower.

Whilst on the subject of wildlife in the house, I am bound to say a few words about children and pets. I have found that children are absolutely fascinated with nature if you can light the flame when they are young and before their peers start to say it is wimpish (sadly, a common response to too many youngsters who are serious about almost any subject except sport). Show children an ants' nest, keep some caterpillars, hunt moths with a sugar lick or wine rope at night, or just go on a very simple "garden safari" looking under stones, searching for birds' nests, collecting seeds, dipping for water bugs in your pond, seeing if there have been any visitors to your hedgehog house or insect boxes. Enthusiasm is infectious: they'll be hooked.

Pets, and by this I mean cats and dogs, beloved family members may they be, can be the bane of the wildlife gardener without a little thought and control. Dogs romp, dig, chew, chase, kill, pee and poo. They leap into ponds, bark at birds, and bury bones - actually this last can be a rich source of food for the decomposers when Fido forgets where he interred it. Training is the only answer other than time – they become much less energetic when they are old. Fortunately, dogs usually sleep for up to 70% of the time, but for the remainder, taking them on walks for bodily functions and teaching them not to chase, dig and kill have to be part of the responsibility





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<sup>5</sup> Not just because insectivorous birds will be attracted to their prey there but it has also been found that some birds use herbs in nest building, hypothesized to be as a deterrent to pests/bacteria).

## *In Horto Feritas*

of dog ownership. Do, please, avoid having a large dog unless you really have a huge garden and plenty of space to walk them.

Cats and wildlife are often a contentious mix. There is no point in pretending this uncomfortable fact about some of our beloved moggies does not exist. Although there are cats that do not hunt, our household felines are responsible for the deaths of many garden birds. The Royal Society for the Protection of Birds has some practical advice:

-  Give your cat a brightly-coloured collar with a bell, elasticised in case it snags – and change both regularly;
-  Keep your cat well fed and comfortable so it is less inclined to go out on the prowl;
-  Have your cat neutered so that it does not suffer the urge to wander off in search of a mate and, if it is female, perhaps produce kittens in the garden or elsewhere in the wild;
-  Keep your cat indoors at night and especially around dusk and dawn, and in winter when birds must have all available time to feed undisturbed.

The Sylvester–Tweetie Pie scenario is not all. Jerry and his relatives are also killed by Tom in real life, if not in cartoons, and some of the above measures may help save a few small mammals from untimely felinogenic demise. I fear I have also seen cats hook newts out of ponds, not to mention fish, although the latter are usually quick enough to escape. Cats will also use your freshly dug flower-bed, or that heap of sand you were about to use for laying slabs, as a toilet, so it pays to train them to relieve themselves in a litter tray indoors.

Finally, in talking about buildings and structures, you will sometimes find traces of long dead plants and animals in the rocks and stones used in building, as fossils. A load of gravel from a limestone area can produce an amazing array of belemnites, *Gryphaea*, etc. Bricks and mortar won't hold much interest, but it is surprising how many homes contain polished stone, in bathrooms and kitchens for

## *In Horto Feritas*

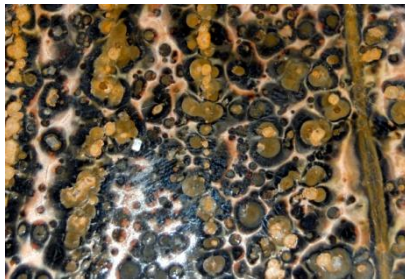
example, or around a fireplace, that are fossiliferous. Below are examples of what you might find (and you'll discover much more geology amongst your jewellery!).



Detail of ammonite in Devonian brown Moroccan marble not uncommonly found in bathroom surfaces.



Fossil fish (*Knightia* sp.) employed as an unusual decorative tile.



Leopard skin rhyolite used as an inlay.

## Outhouses, greenhouse and garage

Garden sheds – a whole social history is there. There is something about a shed: the clutter reminiscent of an old-fashioned ironmonger's, the smell of earth, mowers and paraffin, a place where the stresses of the world seem a long way off. For the wildlife gardener, though, sheds, garages and outbuildings generally, with the exception of the greenhouse which I shall come to shortly, present two main opportunities beyond their obvious utilitarian functions: somewhere to plant climbers and places for birds to nest. They are also, of course, where the handier amongst us can make, or repair, all manner of bird and bat boxes, hedgehog houses, insect habitats and many of the accoutrements of the garden naturalist.

I would remark again here on the importance of climbers. No opportunity should be missed to plant them – a bare wall is a vertical plant space on offer as is any post, pillar, fence, trellis or tree trunk. Scattered through this book is mention of climbing plants where I have thought of them and Appendix III lists a few as well.

Ornithologically, sheds and outhouses, being generally less disturbed than the main dwelling, provide the ideal place for several garden bird species to nest, so do place nest boxes and ledges on suitable walls. All manner of insects and a few small mammals appreciate the shelter of a shed or garage, too, especially in winter, so leave some piles of pots, off-cuts, sacks or netting untidied for a few months. No encouragement needed for me, that's certain.

“Who loves a garden, loves a greenhouse too”, as Cowper said. The greenhouse is my and many others' favourite place in the garden. I have often asked myself why – something to do with being productive perhaps, from seed to flower, cutting to thriving shrub, back-bulb to a mature orchid. Creativity, relaxation, escapism, appreciation of beauty, fulfilment, solitude, intellectual challenge, scent, interests shared, pride in results, warmth on cold days, spring in winter – all these enter the subtle mix that brings joy. Above all,

## *In Horto Feritas*

though, from the smallest frame to the largest palm house, the protection of glass (or increasingly polycarbonate) creating a controlled and sheltered growing environment is the pervasive benefit to plants. For the wildlife gardener, a simple frame or small unheated greenhouse will make all the difference in producing, from various propagules, the plants needed to populate your garden efficiently and economically. Yes, of course you can go to the garden centre or order plants on-line from specialist suppliers, at a price. But how much more satisfying and rewarding to raise your own!



The author's greenhouse

This is not a horticultural manual and there are a thousand books and websites to help with propagation and pot culture so I will leave this chapter with a few personal thoughts and tips about growing under glass:





## *In Horto Feritas*

- 🌸 If you can keep out the frost, it will enable you to grow a huge range of species and varieties, but for the wildlife garden where plants need to fend for themselves in the cold, heating is not necessary. An electric propagator for starting seeds and cuttings, though, I suggest is almost obligatory.
- 🌸 The spring sun is powerful – ventilate and use shading early (from March) to avoid crispy disappointment.
- 🌸 Mice wreak havoc – keep them out. If they enter, use a live trap, baited with peanut butter over night, and release your furry intruders outside early next day. Find where they got in and block up. They can wriggle through surprisingly small gaps!
- 🌸 Watch out for aphids, red spider, whitefly, mealy bug, scale and gastropods. All these thrive in greenhouses and frames. Use approved organic control methods.
- 🌸 More plants die from over-watering than under-watering, especially in the cooler months.
- 🌸 If you are growing early spring bulbs and other precocious flowers in pots, leave a side vent open during sunnier days: bumblebees and other insects will come in for the nectar – ensure they have gone before you close up and obviously don't use any pesticides that may kill them.
- 🌸 Use high quality, sterilised potting and seed-raising composts. I have had disastrous results with some of the recent peat-free/peat replacement products. Buy reputable brands and be prepared to pay a little more – much gnashing of teeth and wringing of hands will be avoided.
- 🌸 Collect rainwater from the roof into a water butt. Don't fiddle around with the ones that have a tap: obtain one with a wide top (usually a barrel type) into which to dip your watering can to fill it up quickly. Fit a lift-off lid to keep out leaves and general gunge.
- 🌸 Unless you have an eidetic memory, label your stock!

### Green roofs, living walls and the like







Compared with countries like Germany, Britain has been slow on the uptake when it comes to green roofs. Even now, they are a rare feature in new builds and I can say from personal experience that they have been unpopular with many house-builders and developers. This is usually said to be for reasons of cost, due to extra weight and design factors, but I am not so sure. With the new approach to costing “ecosystem services” and calculating their benefits, the financial advantages of green roofs become clear. Green roofs look good and people enjoy them: they help conserve water and reduce storm run-off problems, contribute to keeping water clean by filtering particulates through the planted zones, sequester CO<sub>2</sub> and air pollutants and produce oxygen, plus they insulate buildings and cool them through effects of shading and evapotranspiration. Planted surfaces assist in counteracting the “heat island” effect in large conurbations, something that may become ever more important as climate change creeps up on us. Above all in the context of this book, green roofs, walls and planted surfaces generally create another whole class of rich wildlife habitats.

As I mentioned earlier, this is not an instruction manual and there are now dozens of books and on-line information sources about constructing and maintaining green roofs and walls. Here are some facts and general tips distilled to give you a potted guide:

-  Mats and pre-planted modules may be quicker but most installations take twelve to eighteen months to establish.
-  Success needs a correct balance of species, climate (macro and micro) and substratum.
-  Be prepared to spend time on the project. Maintenance is important for long term success.
-  Hand weeding can be crucial, especially in the early stages, to ensure long term success. Remove weedy colonisers like annual meadow-grass *Poa annua* and wavy bitter-cress *Cardamine flexuosa* before they seed. If left unchecked, unwanted weedy species will out-compete planted material

## *In Horto Feritas*

and then tend to die, leaving unsightly patches. Established roofs are more resistant to undesirable colonisers.

-  Laid rooting medium must be sterile and without weed seeds. A little fertilizer may be needed during establishment – this is usually provided by the growing medium for the first year, but thereafter requires monitoring. If you do need it, use slow release (14-14-14 plus trace elements) at a rate to deliver about 5g N 100 m<sup>-2</sup> as a general rule.
-  Irrigation is critical for new plantings until established, when botanical choice for the region, if correct, should mean no further watering will then be needed – in drier areas, water for three weeks after planting then reduce gradually. Automatic watering systems will need careful adjustment – incorrect irrigation has the potential to cause significant establishment failure – sub-irrigation may be sufficient but overhead may also be needed temporarily in dry, windy conditions to reduce stress of newly planted material.
-  The planting season can also be critical – it depends on local climate. Avoid planting in cold and/or dry weather: aim for a month of temperatures above 4°C after planting if you can when drought is unlikely, *i.e.* spring or autumn – spring in colder areas to build up resistance, autumn if winters are mild in your area.
-  Planting medium may be susceptible to wind erosion in dry, windy areas – use heavier substrata plus initial irrigation.
-  Decide if you want to try to use all native species for planting or not. Doing so will limit your choice significantly and you will miss out on some beautiful flowers. Whether using all natives is better for wildlife is a moot point. On balance, I think not because many exotics extend the flowering and thus nectar/pollen season. Including a high proportion of native plants in the mix will supply foodplants for autochthonous invertebrates.
-  If you are worried about fire risk, remember succulents like sedums which are usually the mainstay of this kind of planting are fire retardant.

## *In Horto Feritas*



Consider carefully what may be limiting climatic factors in your area (salinity/salt spray, polluted atmosphere, acid rain, excessive heat or wind). Use only truly xerophilous plants such as succulents in the drier regions of southern and eastern England, and install 15cm depth of growing medium.

Here are some green roof and green wall plants suitable for the UK. There are many native species in the list. (Please remember to check soil pH and other edaphic & environmental requirements before selecting.)

alpine meadow-grass *Poa alpina*  
biting stonecrop *Sedum acre*  
bladder campion *Silene vulgaris*  
bloody crane's-bill *Geranium sanguineum*  
blue moor-grass *Sesleria albicans*  
Breckland thyme *Thymus serpyllum*  
broad-leaved meadow-grass *Poa chaixii*  
chives *Allium schoenoprasum* (and several other wild onions)  
cobweb house-leek *Sempervivum arachnoideum*  
common bent *Agrostis capillaris*  
common bird's-foot-trefoil *Lotus corniculatus*  
common centaury *Centaurium erythraea*  
common fumitory *Fumaria officinalis*  
common house-leek *Sempervivum tectorum*  
common mallow *Malva sylvestris*  
common rockrose *Helianthemum nummularium*  
creeping bent *Agrostis stolonifera*  
crested dog's-tail *Cynosurus cristatus*  
dwarf sedge *Carex humilis*  
English stonecrop *Sedum anglicum*  
fine-leaved sandwort *Minuartia hybrida*  
glaucous sedge *Carex flacca*  
great mullein *Verbascum thapsus*  
harebell *Campanula rotundifolia*  
hen-and-chickens *Jovibarba sobolifera*  
hoary cinquefoil *Potentilla argentea*

## *In Horto Feritas*

lavender *Lavendula angustifolia*  
maiden pink *Dianthus deltoides*  
marjoram *Origanum vulgare*  
meadow saxifrage *Saxifraga granulata*  
mountain alison *Alyssum montanum*  
mountain avens *Dryas octopetula*  
mouse-ear hawkweed *Pilosella officinarum*  
perforate St. John's-wort *Hypericum perforatum*  
purple saxifrage *Saxifraga oppositifolia*  
red fescue *Festuca rubra* s.l.  
red valerian *Centranthus ruber*  
reflexed stonecrop *Sedum rupestre*  
sheep's fescue *Festuca ovina*  
sheep's-bit scabious *Jasione montana*  
smooth meadow-grass *Poa pratensis*  
snow-in-summer *Cerastium tomentosum*  
spring sandwort *Minuartia verna*  
tasteless stonecrop *Sedum sexangulare*  
thrift *Armeria maritima*  
thyme-leaved sandwort *Arenaria serpyllifolia*  
toadflax *Linaria vulgaris*  
upright brome *Bromus erectus*  
wall germander *Teucrium chamaedrys*  
wavy hair-grass *Deschampsia flexuosa*  
white stonecrop *Sedum album*  
wild carrot *Daucus carota*  
wild mignonette *Reseda lutea*  
wild thyme *Thymus polytrichus* (many thyme varieties)  
yarrow *Achillea millefolium*  
yellow alison *Alyssum saxatile*  
yellow chamomile *Anthemis tinctoria*  
yellow oat-grass *Trisetum flavescens*  
Yorkshire-fog *Holcus lanatus*

*In Horto Feritas*



English stonecrop *Sedum anglicum*



Wild thyme *Thymus polytrichus*



Thrift *Armeria maritima*



Biting stonecrop *Sedum acre*



Spring sandwort *Minuartia verna*

## CHAPTER 5 LAWNS AND LONGER GRASS

“...grasses – these most important and not unattractive plants.”

C.E. Hubbard

### Lawns

The Wildlife Gardener will need to eschew the forb-free stripy oligoculture that is the epitome of traditional *gazon anglais* paradigm. A close-cut sward of fine grasses without moss, clover, daisy or worm is but a shadow of the rich ecosystem that a lawn can be. Keep off the pesticides, selective weed-killers and fertilizers and set the mower blades to medium or high – saving money and time in the process – and you will quickly have a charming, floriferous and species-rich habitat to which you will no longer be a slave.

Much wildlife is attracted to lawns as well as those animals that live within its stems and roots. Blackbirds, robins and other thrushes, starlings, carrion crows, rooks, jays, magpies, pigeons and doves are often seen on lawns, searching for food. Hedgehogs, moles (though they can turn the lawn into something resembling the Somme after the battle), shrews, voles, field mice and squirrels all love lawns, too, and weasels, stoats, foxes, owls and kestrels may well be attracted to a meal on this green dining table.

Don't let people tell you moss is bad – it is the great saviour of the lawn. Moss is springy, green in winter, covers bare patches and scuffs, and grows in the shade; it is great for the birds to build nests and home to a host of mini-beasts. Grasses and forbs soon grow through in the summer.

Below is a list of flowering plants other than grasses and mosses that grow well in lawns, many of which will bloom at a low height, so adding colour and food for bees and other nectariphagous invertebrates. In late June you can have a break in the mowing regimen to allow taller species to flower, too, if you wish. A lawn with a mix of these in with the grass and moss is the near perfect

## *In Horto Feritas*

ground cover and will form a backdrop or centrepiece for any garden, wildlife value notwithstanding.

black medick *Medicago lupulina*

bugle *Ajuga reptans*

buttercups *Ranunculus* spp

chamomile *Chamaemelum nobile* (sandy soils – in the south)

clovers *Trifolium* spp

common bird's-foot-trefoil *Lotus corniculatus*

creeping cinquefoil *Potentilla reptans*

daisy *Bellis perennis*

dandelion *Taraxacum officinale* agg.

eyebright *Euphrasia officinalis* agg.

heath wood-rush *Luzula multiflora* (acid soils)

procumbent pearlwort *Sagina procumbens*

ribwort plantain *Plantago lanceolata*

selfheal *Prunella vulgaris*

speedwells *Veronica* spp

yarrow *Achillea millefolium*

### Longer grass

When it comes to longer grass, we enter another world altogether. It may be that you do not want long grass at all in your garden, but I would urge you at least to consider a species-rich “mini-meadow” which will be easy to manage and will greatly enhance your garden’s interest and the wildlife it will attract. The National Vegetation Classification<sup>6</sup> has twenty-seven main British lowland<sup>7</sup> grassland types, excluding sea cliffs and weedy communities. In *British Wild*

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<sup>6</sup> Rodwell, J.S. (Ed) (1991 *et seq.*). *British Plant Communities*. Cambridge University Press, Cambridge, UK.

<sup>7</sup> If you live in the uplands above about 200 m altitude, you will be in very different botanical territory which is rather beyond the intended scope of this book – but think mat-grass *Nardus stricta* and purple moor-grass *Molinia caerulea* as well as many of the other species mentioned in this chapter, intermixed with rushes, wood-rushes, sedges, heathers, bilberry and many bryophytes and lichens.

## *In Horto Feritas*

*Plants in Natural Associations*<sup>8</sup> I suggested five lowland acid grassland types, nine on circumneutral soils and another eight that favour calcareous substrata.

### Calcifuge grasslands

On acid soils in gardens having a pH about 5 or less, tall grassy areas that are cut just once or twice a year, and the hay removed, will probably be dominated by sheep's fescue *Festuca ovina* with common bent *Agrostis capillaris* (or in the south-west, bristle-leaved bent *A. curtisii*) and perhaps wavy hair-grass *Deschampsia flexuosa*. Other grasses in varying amounts, sometimes co-dominant depending on the soil, geographical area and management, may include red fescue *Festuca rubra* s.l., sweet vernal-grass *Anthoxanthum odoratum* and early hair-grass *Aira praecox*. Forbs are likely to be:

common bird's-foot-trefoil *Lotus corniculatus*

common dog-violet *Viola riviniana*

common ragwort *Senecio jacobaea*

heath bedstraw *Galium saxatile*

lady's bedstraw *Galium verum*

mouse-ear hawkweed *Pilosella officinarum*

ribwort plantain *Plantago lanceolata*

sheep's sorrel *Rumex acetosella*

tormentil *Potentilla erecta*

yarrow *Achillea millefolium*

The above will often be with mosses and lichens such as *Brachythecium albicans*, *Dicranum scoparium*, *Polytrichum piliferum*, *Hylocomium splendens*, *Hypnum cupressiforme* s.l., *Pleurozium schreberi*, *Pseudoscleropodium purum*, *Rhytidiadelphus squarrosus*, *Cornicularia aculeata* and *Cladonia* spp. Watch out for colonising bracken *Pteridium aquilinum* which is very invasive and

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<sup>8</sup> For details see [www.ecology-biodiversity.co.uk/ecommerce](http://www.ecology-biodiversity.co.uk/ecommerce).

## *In Horto Feritas*

smothering. Under management with less regular cutting, heather *Calluna vulgaris* and bell heather *Erica cinerea* may appear.

### Mesotrophic grasslands

On circumneutral soils with pH 6 to 7, which are probably what most of us have in our gardens, away from the chalk and siliceous parent rocks anyway, the autochthonous grassland is very different and that will be reflected in what will grow and establish well on your plot. What I call “traditional lowland hay meadow” is likely to be what you have or should aim for, although there are various other grassland types on rich alluvial soils or poorly-drained ground. In a new or neglected garden, the taller grassy areas are probably rather rank and coarse, though, dominated by false oat-grass *Arrhenatherum elatius*, cock’s-foot *Dactylis glomerata*, Yorkshire-fog *Holcus lanatus* and tufted hair-grass *Deschampsia cespitosa*, or remnants of amenity or agricultural grassland dominated by perennial rye-grass *Lolium perenne*. The aim is, through regular cutting and management as described below, to persuade these coarse communities to become a finer sward that contains a wealth of flowering broad-leaved wild plants and other forbs within it. The grasses that should be abundant in a flower-rich meadow would include: sweet vernal-grass *Anthoxanthum odoratum*, crested dog’s-tail *Cynosurus cristatus*, yellow oat-grass *Trisetum flavescens*, common bent *Agrostis capillaris*, timothy *Phleum pratense*, smooth & rough meadow-grasses *Poa pratensis* and *Poa trivialis*, meadow foxtail *Alopecurus pratensis*, red fescue and meadow fescue *Festuca rubra* and *F. pratensis*, with lesser amounts of cock’s-foot, Yorkshire fog and perennial rye-grass. The forbs below would be some of the ones to encourage:

autumn hawkbit *Leontodon autumnalis*

bulbous buttercup *Ranunculus bulbosus*

cat’s-ear *Hypochaeris radicata*

common bird’s-foot-trefoil *Lotus corniculatus*

common mouse-ear *Cerastium fontanum*

## *In Horto Feritas*

common knapweed *Centaurea nigra*  
common sorrel *Rumex acetosa*  
daisy *Bellis perennis*  
dandelion *Taraxacum officinale* agg.  
field wood-rush *Luzula campestris*  
great burnet *Sanguisorba officinalis*  
lady's bedstraw *Galium verum*  
meadow buttercup *Ranunculus acris*  
meadowsweet *Filipendula ulmaria*  
meadow vetchling *Lathyrus pratensis*  
oxeye daisy *Leucanthemum vulgare*  
pepper-saxifrage *Silaum silaus*  
red clover *Trifolium pratense*  
ribwort plantain *Plantago lanceolata*  
selfheal *Prunella vulgaris*  
white clover *Trifolium repens*  
yarrow *Achillea millefolium*  
yellow rattle *Rhinanthus minor* agg.

The moss *Brachythecium rutabulum* is a common component of this type of grassland, but lichens are rare. Less well-drained ground may have creeping bent *Agrostis stolonifera*, marsh foxtail *Alopecurus geniculatus* and silverweed *Potentilla anserina*, perhaps with some sedges. It is worth planting some snake's head fritillary *Fritillaria meleagris* bulbs in this kind of grassland.

### Calcicolous grasslands

For those on chalk or limestone with soils of more than pH 7, the grassland will be different again. Here will likely be tor-grass *Brachypodium pinnatum*, upright brome *Bromopsis erecta*, quaking-grass *Briza media*, crested hair-grass *Koeleria macrantha* plus the euryoecious sheep's and red fescues and meadow and downy oat-grasses *Avenula pratensis* and *A. pubescens*. A wide range of typical and often very attractive forbs will do well in this kind of grassland. Some are listed below but there are many rare calcicolous associates

## *In Horto Feritas*

and several wild orchids worth trying to establish as long as you can obtain plants or propagules that have not been taken unlawfully from the wild.

autumn gentian *Gentianella amarella*  
black medick *Medicago lupulina*  
burnet-saxifrage *Pimpinella saxifraga*  
common bird's-foot-trefoil *Lotus corniculatus*  
common ragwort *Senecio jacobaea*  
common rock-rose *Helianthemum nummularium*  
common sorrel *Rumex acetosa*  
dandelion *Taraxacum officinale* agg.  
dwarf thistle *Cirsium acaule*  
fairy flax *Linum catharticum*  
glaucous sedge *Carex flacca*  
goat's-beard *Tragopogon pratensis*  
harebell *Campanula rotundifolia*  
hoary plantain *Plantago media*  
lady's bedstraw *Galium verum*  
large thyme *Thymus pulegioides*  
mouse-ear hawkweed *Pilosella officinarum*  
red clover *Trifolium pratense*  
ribwort plantain *Plantago lanceolata*  
rough hawkbit *Leontodon hispidus*  
salad burnet *Sanguisorba minor*  
selfheal *Prunella vulgaris*  
small scabious *Scabiosa columbaria*  
smooth hawk's-beard *Crepis capillaris*  
spring-sedge *Carex caryophyllea*  
squincancywort *Asperula cynanchica*  
wild thyme *Thymus polytrichus*

The mosses *Homalothecium lutescens* and *Scleropodium purum* are common in calcareous grasslands and, in open chalky, sharply-drained swards, several *Cladonia* spp and other terricolous lichens grow well.

## *In Horto Feritas*

If you are preparing an area as flower-rich grassland, check your soil type and then purchase a suitable seed mix from a supplier of native species.

### General note on grassland establishment

When establishing new semi-natural grassland by sowing, seed should be rolled rather than raked as the latter tends to bury it too deeply. Always ensure that the native soil chemistry, physical structure and humidity are right for the intended community. Sow seed with a spreading agent such as light, dry sand (not organic material such as chicken mash or barley meal as sometimes recommended because these will introduce undesirable nutrients). Some plants can be obtained pot-grown and introduced into the sward, but monitor watering needs and competition until established. Do not add fertilisers and keep a careful watch for drought at critical germination time, watering if required. Select a suitable cutting regime (see below) to promote the type of sward required (early flowering, late flowering, *etc.*) or mix the regimes over different areas. Keep some tall stems and dead above-ground biomass standing over winter for arthropods and small mammals, but generally remove cut/mown biomass for composting or hay in order to prevent choking, forb suppression and nutrient enrichment. You can mow paths around the edge of taller grass areas, or through them if they are large, to keep the area tidy and for access.

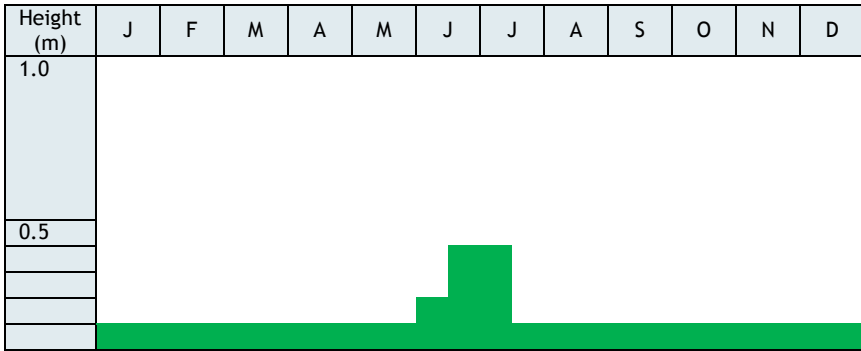
### Cutting regimes for grass areas

In these indicative timetables, mow/cut to maintain the heights indicated in each month (the heights are not to scale!).

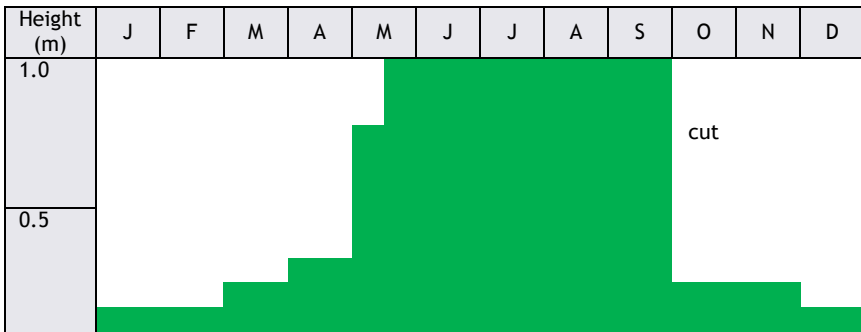
Flowery lawn – cut every ten to fifteen days in the growing season (March to October) with mower blades set to medium, giving a cut sward height of around 25–30 mm. To allow lawn plants to flower, cease mowing for a month or so about mid May/June. Always collect the mowings and avoid

## *In Horto Feritas*

mulch mowers as they tend to increase soil fertility over time as well as suppressing broad-leaved plants in the lawn.

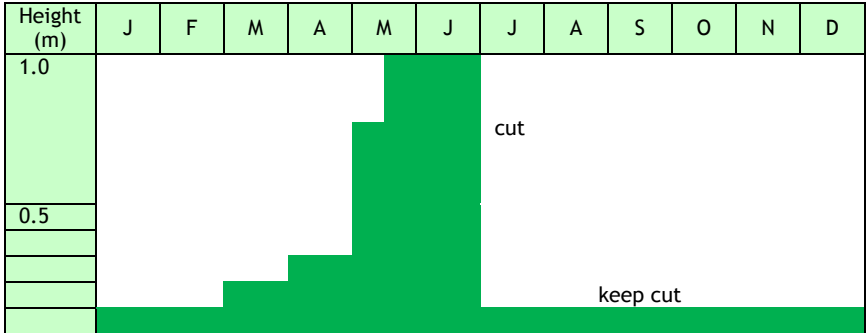


Minimal management – all this does is halt ecological succession so the grassland area does not become scrub, with a single annual cut in September (or it could be October) after flowering and seed setting.

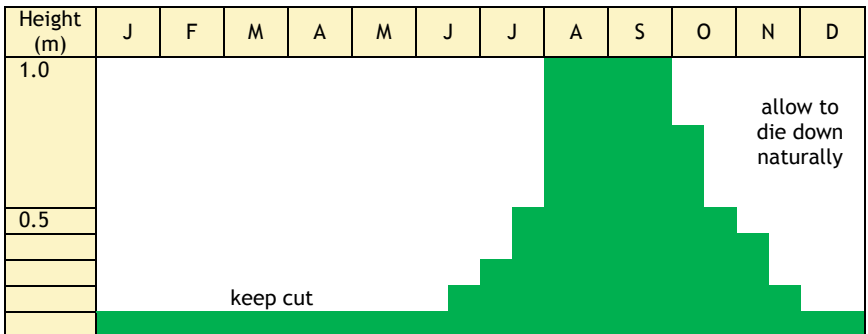


## *In Horto Feritas*

Spring meadow – traditionally, this regime in the countryside would have been used to produce a crop of hay at the end of June, then the grassland would be grazed until the end of the growing season, left over the winter and allowed to grow up ready for the hay again in early summer, possibly with a little “early bite” grazing just at the very spring start of the growing season. In the garden, it is a way of encouraging spring-flowering plants to establish.



Summer meadow – favours later-flowering meadow plants of high summer and allows them to set seed. Keeping the sward cut regularly to a height of 50 mm or so in spring will discourage coarser grasses.



## CHAPTER 6 FLOWER BEDS

*“Gone from most gardens are the old fashioned herbaceous borders ... and in their place we find monstrous dahlias and chrysanthemums and assorted bedding plants which have often been bred for size and colour at the expense of scent and nectar.”*

Michael Chinery, *The Natural History of the Garden*.

Broadly, flower beds are of the semi-permanent planting type, with herbaceous perennials forming most or the only denizens, or display beds of annuals, biennials or short-lived perennials which are changed frequently, usually with the seasons. As far as wildlife is concerned, these are very different habitats, the former with niches of sufficient duration to become home to a host of arthropods, the latter as a transient source of nectar and nutrients for the quick-sippers, opportunists and boom-and-bust *r*-selected<sup>9</sup> invertebrates. Both types provide some foraging for small mammals and birds, although the pickings amongst permanent plantings will be richer, except perhaps when you are turning over the soil to expose tasty snacks for robins and other thrushes.

Here is a good point to say a few words about the merits of exotic *versus* native plants. The general feeling is that native plants support more wildlife, well arthropods anyway, because there will be many more species that have evolved in association with them over the millennia. Exotic plants, meanwhile, with their unfamiliar phytochemistry, secondary metabolites and micro-morphological characteristics, will have relatively fewer dependents, pathogens and parasites – a much poorer associated food web in other words. This is a topic of interest to the Royal Horticultural Society which is working to answer the question of how many arthropods are found in beds of native as opposed to exotic plants, and related issues. The RHS has found that established beds have 30–40% more insects associated with them than short-term/early plantings and results about the native–exotic research will be published when complete,

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<sup>9</sup> See footnote in Chapter 7 for an explanation of this term.

## *In Horto Feritas*

probably by the time you read this<sup>10</sup>. It is known that arthropods adapt quickly to using many exotic plants, especially those that are close relatives of our native wild flowers, but others are slow to become part of the food web. For now, it is safer to assume that gardens of greater value to wildlife will be those that contain a high proportion of native plants, so go for these or their horticultural varieties wherever you reasonably can but without sacrificing the rich diversity of plants so many have travelled the world to bring us over the centuries.

It is difficult to equate the artifice of flower beds with particular semi-natural habitats of the wider countryside. Spring bedding may reflect the flush of flowers seen along a woodland ride, perhaps, with primulas, forget-me-not, pansies and spring bulbs; whereas summer bedders may echo a panorama of rather ephemeral prairie blooms with *Gazania*, *Petunia*, *Nicotiana*, snapdragons, *Mimulus*, *Salvia*, *Verbena*, *Zinnia*, cornflower, sunflowers, poppies, *Cosmos*, *Nasturtium* and the rest, extending into autumn. Many can be grown easily from seed. For winter into earliest spring, we could think of woodland again, where a few plants resistant to cold can shelter under hedges and trees in the wild – primroses, violets, *Erysimum* and hardy *Cyclamen*.

The permanently planted beds are reminiscent of meadows, and plains but without the preponderance of grasses that typify those wild habitats, and of the ecotones along field boundaries, rides, paths and water courses, “border” being an apt descriptor. Here we find a wealth of plants imported from all over the world, or bred varieties of wild species. For the wildlife gardener, as wide a medley as possible with a long succession of flowering and a bias in favour of native species or horticultural cultivars of them should be the general aim. The choice is almost limitless, but a suggestion of some of the best is given in the following list. As always, take careful account of your soil type, orientation, degree of shade, *etc.*

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<sup>10</sup> See [www.rhs.org.uk/plants](http://www.rhs.org.uk/plants). The RHS has also initiated a labelling scheme for plants favoured by bees and other pollinators called “Perfect for Pollinators”. Look out for the logo when you buy.

## *In Horto Feritas*

*Achillea* (many garden varieties such as ‘Summer Berries’)  
asters – huge range – the dwarf, compact ones are excellent  
foxgloves – many forms and colours  
*Gaillardia* (many varieties – try ‘Messa Yellow’)  
geraniums (hardy types)  
*Geum* spp/varieties  
heathers if you have acid soil  
hellebores such as Christmas and Lenten roses now in many forms  
*Helenium* (large range, ‘Helena Red Shades’ are red edged gold)  
*Eryngium planum* (many eryngos available – try ‘Blue Hobbit’)  
goldenrod  
hollyhocks  
lavenders of all sorts  
*Lythrum* spp –the loosestrifes are very attractive to insects  
*Monarda* varieties  
phlox – many forms  
red hot pokers (*Kniphofia*)  
sages (*Salvia*)  
*Scabiosa japonica*  
*Sedum spectabilis*  
thistles, ornamental (e.g. *Onopordum*, *Cirsium* ‘*Atropurpureum*’)

Remember to choose varieties with single, open flowers wherever possible. By all means add a few ornamental grasses with seeds that birds eat such as *Pennisetum* ‘Fairy Tails’ or ‘Red Buttons’, or varieties of the native *Briza media*. For more plants see Appendix III.

### Bees



Flower beds are some of the best nectar and pollen sources for bees in the garden, though this is not to forget the many flowering shrubs and climbers that benefit them, or the fruit and vegetables they pollinate

## *In Horto Feritas*

for us. Bees are a taxon – there is a large number of species – that has been having a hard time of it in recent years, diseases, predation and changes in land use all having taken their toll. Nor, of course, are bees the only pollinators besides the wind, as hundreds of insects and their relatives perform that role, plus even a few birds and mammals in climes warmer than Britain. For us, though, bees are the main concern and they need good nectar plants to provide high octane fuel for their hectic lifestyle. Try to provide a succession of flowers for them through the whole year, especially in July and August when flying long distances can weaken them and make them susceptible to pathogens. As above, select open, single flowers if you can, rather than doubles, and plant in groups of the same variety. Pick plants with a long flowering season.

In the early part of the year, winter aconites, snowdrops, crocus spp, winter clematis, hellebores, *Mahonia* spp, *Sarcococca* spp and laurustinus are all good. In spring bugle, *Aubrieta*, *Alyssum*, *Muscari*, star-of-Bethlehem, Japanese quince, heathers, sparges, candytuft, honesty, wallflowers, Japanese quince, ornamental *Prunus* and many ornamental spring-flowering shrubs and trees come into their own as nectar plants. In summer, the choice is enormous with far too many plants to list here, but think particularly of marigolds, mints, thymes, marjoram, sage and other herbs, *Sedum*, catmint, *Nicotiana*, poached egg plant, ornamental thistles, daisies, lavenders, hollyhocks, foxgloves, forget-me-nots and the less invasive varieties of *Buddleia*.

Other tips to help bees include not being too tidy and leaving some weeds to flower such as daisies and dandelions, avoiding herbicides and pesticides, ensuring fresh water is available in a shallow pond margin or dish where they won't drown.

### Scent

Flowers evolved perfume not, of course, for our pleasure although we have enhanced it through breeding, but to attract pollinators

## *In Horto Feritas*

with an olfactory sense. Plant breeders have built on nature's traits in this as in many other attributes of flowers. A garden without perfume is a feast without flavour and I have mentioned many fragrant plants in these pages. Here are some favourites gathered into one list:

bearded irises – as well as being gorgeous, many are scented  
bluebell *Hyacinthoides non-scripta*

*Coronilla valentina* ssp. *glauca*

*Daphne* – many are scented but not always very hardy

flowering currant (yellow) *Ribes odoratum*

flowering tobacco *Nicotiana* (annuals) – choose scented ones

honeysuckle *Lonicera periclymenum* and varieties

hyacinth *Hyacinthus orientalis*

Korean spice viburnum *Viburnum carlesii*

lavender *Lavandula* varieties

lilac *Syringa vulgaris* and the many horticultural varieties

lilies *Lilium* spp and varieties that are scented

lily-of-the-valley *Convallaria majalis*

Mexican orange blossom *Choisya ternata*

mock-orange *Philadelphus* spp and varieties

*Narcissus* – several are heavily scented

*Osmanthus burkwoodii*

pinks and carnations *Dianthus* spp and old fashioned varieties

roses (take care to pick the scented ones, many are not)

*Sarcococca* spp.

shrubby honeysuckle *Lonicera fragrantissima*

star jasmine *Trachelospermum jasminoides*

stocks *Matthiola incana* and other spp.

summer jasmine *Jasminum officinale*

sweet peas

sweet rocket *Hesperis matronalis*

sweet violet *Viola odorata*

virgin's bower *Clematis flammula*

winter-sweet *Chimonanthus praecox* – can be slow to flower




*Wisteria* spp and varieties

## CHAPTER 7 THE VEGETABLE AND FRUIT GARDEN







*“As to the produce of a garden, every middle-aged person of observation may perceive, within his own memory, both in town and country, how vastly the consumption of vegetables is increased.”*

Gilbert White. *Natural History and Antiquities of Selbourne*.  
1876, Letter LXXIX.

In these areas of the garden, wildlife is usually rather a dirty word, provoking thoughts of aphids, whitefly, root flies, leatherjackets, wireworms, gall & spider mites, cabbage whites, squirrels, pigeons, scoffing blackbirds, pathogenic fungi and a seemingly endless list of pests and diseases that would precociously take or ruin our produce. But think again: with suitable cultivation methods, selection of resistant varieties, encouragement of natural predators, slug traps and similar, the use of netting and occasional treatment with non-persistent sprays of the kind approved for organic gardening, you can have a productive fruit and veg patch without negative impacts on your garden ecosystem. You may not always have the uniform and unblemished produce of the supermarket shelves, but the trade-off to gain flavour and nutrients for a few holes and blotches is no contest, not to mention personal satisfaction and financial economy. Here are some thoughts on how to obtain very satisfactory crops whilst encouraging desirable wildlife and deterring the unwelcome.

-  This is one area of the garden where tidiness is important so clear away all old crops, leaves, prunings, dead wood and rubbish to the compost heap area (see Chapter 12) so that pests have fewer places to hide.
-  Embrace the hoeing habit.
-  Encourage insectivorous birds by keeping dried mealworms and other food for them in the plot during the coldest months so they will stay to forage at other times to help control aphids, slugs, snails and other crop spoilers – use cloches or netting to protect crops from pigeons, blackbirds and other species that would otherwise make a meal of them. An average brood of blue tits will consume 10,000 invertebrate pests during their three weeks in the nest.

## *In Horto Feritas*

-  To deter squirrels if netting is inadequate, as it may well be, apply an organic deterrent containing hot red pepper juice in which the active ingredient is capsaicin, the substance that makes chillies hot. Juice from hot chillies mixed with water and a few drops of liquid soap as a wetting agent should do the trick. It is available commercially if you prefer. Re-apply after rain, watch out for your eyes and wash anything you are going to eat thoroughly! It won't worry birds as they have no neurobiological sensitivity to capsaicin.
-  Avoid all sprays and treatments unless they are approved by the Soil Association or a recognised organic gardening group. During the nesting season, eschew even these organic sprays in areas open to birds if you can, so that the garden's insectivorous avifauna has plenty of food.
-  Plant marigolds (*Tagetes*, *Calendula*) with your vegetables to encourage predators such as wasps that eat caterpillars and hoverflies whose larvae prey on aphids. Use companion planting generally amongst your fruit and veg – chives and garlic (anti-aphid) with beetroot, carrots and tomatoes; nasturtiums (which are also delicious in salads) lavender and parsley to attract beneficial insects; rosemary near cabbages and relatives to discourage pests of brassicas; chamomile amongst vegetables is generally popular with organic gardeners, as is lemon balm.
-  Use well-rotted manure and compost to build up humus and good soil structure rather than “artificial” fertilisers.
-  Select disease resistant varieties, rotate your crops to reduce soil-borne pathogens and allow plenty of space and air circulation between rows.
-  Remember to plant herbs – many such as bay, oregano, rosemary, the thymes and the mints have exceptional attraction to pollinators, and their aromatic nature deters phytophagous pests. That is why it evolved.

## *In Horto Feritas*

- 🍷 Time your growing to avoid optimum pest periods – for example, plant carrot seedlings in June after carrot flies have finished ovipositing.
- 🍷 Encourage predators of pests in the garden generally. As a wildlife gardener you will be doing this anyway by having insect shelters of straw for lacewings and ladybirds, bird and bat boxes, hedgehog habitats and a pond for frogs and toads. Remember pests tend to be *r*-selected<sup>11</sup> “boom-and-bust species” species, capable of fast reproduction and recovery from catastrophe, but most predators, even amongst invertebrates, tend towards *K*-selection and probably have only one brood per year – destroy them and they will not recover, at least not quickly.
- 🍷 Keep all your tools clean.
- 🍷 Deter slugs and snails with copper tape, loose fine grit or beer traps, and go out at night, especially after rain, and collect them up.
- 🍷 Spearmint and caper spurge are supposed to deter mice but I have no experience of this.
- 🍷 Incinerate all seriously diseased plants.
- 🍷 Double dig in autumn and let the frost get at the soil, or use raised beds if digging is not for you.
- 🍷 If all else fails, grow Jerusalem artichokes and rhubarb which have very few predators!



Pot marigolds *Calendula officinalis* have traditionally been planted with tomatoes and asparagus to deter insect pests; their petals are useful in salads and as a natural source of the carotenoids lutein and zeaxanthin, antioxidants proposed in medical and herbal literature for eye health.

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<sup>11</sup> In population ecology, where *r* is the intrinsic rate of increase and *K* is the upper asymptote or equilibrium population size, individuals of *r*-selected species of unpredictable/ephemeral environments tend towards smaller size, earlier maturity, semelparity, larger reproductive allocation and greater numbers of smaller offspring, investing little in survivorship. In contrast, *K*-selected individuals are often larger, mature later, are iteroparous, display a relatively smaller reproductive allocation (fewer, larger offspring) and invest more in survivorship. Think aphids and apes as two extremes in the *r*–*K* continuum.

## CHAPTER 8 SHRUBS, SHRUBBERIES AND HEDGEROWS

*“With a little adjustment, you can turn your traditional garden shrubbery into a really valuable wildlife habitat.”*

Chris Baines. *How to Make a Wildlife Garden.*

### Rose beds



*Rosa ‘Zéphyrine Drouhin’, a wonderfully scented, climbing bourbon rose.*

I am starting here because rose beds have a very special place in the hearts of so many gardeners, and rightly so. They are oft regarded as the epitome of the English garden, no less so the French. Many strive for perfection in our growing of roses: few succeed. For us lesser mortals, the joy of an evocatively perfumed rose, Whiskey Mac, say, or the thornless Zéphyrine Drouhin, on a summer’s evening stroll through the garden is a pleasure of such subtle and complex dimensions that a little blackspot, mildew, rust or a few aphids cannot succeed in diminishing it.

I am not, therefore, going to suggest anything more than using organic methods and common-sense culture to keep on top of the many diseases roses suffer. Before that, though, remember that larger rambling and climbing roses as well as many of the stronger growing shrubbier types, provide great habitat for nesting birds, usually protected by sharp thorns. Remember, too that aphids are an important part of garden food webs!

There are several treatments for rose diseases that do not contain harmful toxins. For example, you can try spraying with a solution made from dissolving 5 ml of baking soda in a litre of water, adding a few drops of liquid soap as a wetting agent. The rather alarmingly

## *In Horto Feritas*

named “manure tea” is used by gardeners against rose fungal diseases, simultaneously providing a foliar feed. Using a 20 litre container – a large bucket is fine – fill it to about a quarter with well-rotted, old manure, stir well and leave to stand in a warm place such as a greenhouse or shed for three or four days, then strain through muslin or very fine sieve, again adding a few drops of mild liquid soap. The result does have the colour of strong tea but confusion would be unwise. Spray affected roses thoroughly, being sure to cover all surfaces. A garden syringe may be better than a sprayer unless you have a powerful one with a coarse setting. Use the residual manure as mulch around the roots.

If, in your pesticide-free and insect-friendly garden, aphids on your roses are not sufficiently controlled by ladybirds and lacewings, you can squish them by hand or jet them off with the hose. A little soft soap in water applied as a spray also helps with aphid control.



The delicately scented floribunda rose ‘*Danse du Feu*’ climbing up an old apple tree in the author’s garden with more strongly perfumed honeysuckle.

**Shrubs as focal points and in mixed shrubberies**

Shrubs are the backbone of most modern gardens. There is a vast choice for virtually any position and taste. Some are magnificent enough to make a focal point on their own, in a lawn, say, or at the end of a path. For wildlife, the usual rule of selecting species that are native, or varieties of a native, holds, but exotic shrubs, many of which are so beautiful, should not be eschewed. Try to pick



*Magnolia seiboldii*, the Oyama magnolia, in the author's garden has superb, sweetly-scented flowers making a striking focal point in spring.

ones that have a long succession of nectar-rich flowers and provide a thick enough framework for birds to use for nesting. Of the hundreds available, a few specimen shrub suggestions (see also Appendix III) are given below. As usual, think about your microclimate and soil – I would avoid *Ceanothus* in cold gardens, for example.

*Chaenomeles japonica*

*Ceanothus x delileanus* 'Gloire de Versailles'

*Ceanothus* 'Blue Mound' or 'Autumnal Blue'

*Ceanothus thyrsiflorus* 'Skylark'

*Enkianthus campanulatus* 'Red Bells'

*Escallonia* 'E.F. Ball'

*Kolkwitzia amabilis*

*Magnolia denudata* 'Yellow River'

*Magnolia liliiflora* 'Nigra'

*Magnolia seiboldii*

*Magnolia soulangiana*

*Veronica* sect. *Pseudoveronica* 'Great Orme', 'Midsummer Beauty' or 'Sapphire' (these are commonly called hebe)

## *In Horto Feritas*

*Viburnum opulus* 'Roseum'

*Viburnum tinus* 'Gwentllian'

*Viburnum x bodnantense* 'Dawn'

*Viburnum x burkwoodii* 'Anne Russell'

*Weigela* 'Briant Rubidor'

Mixed shrubberies, rather like hedgerows below, can be thought of as woodland edge habitat but, whereas I would recommend keeping hedges, at least your boundary ones, entirely native in their species composition, shrubberies have scope for both exoticism and autochthony. The horticultural choices for planting a shrubbery that is simultaneously comely and ecologically meritorious are extensive, whether it be as foodplants for wildlife, nectar providers, shelter or nesting sites. Always with a habitual eye to soil, aspect and exposure in making your selection, here are some of what I consider the best shrubs for a garden that encourages wildlife, but there are very few shrubs that have no ecological value. (I have not repeated those in the focal point list just above or, excepting hazel, the hedgerow or tree lists further below.)



Autumn colour in the mixed shrubbery

## *In Horto Feritas*

*Buddleia davidii* ‘Miss Ruby’ or dwarf ‘Low and Behold Blue Chip’

*Buddleia globosa*

*Berberis darwinii*

*Corylus avellana* (native – some good ornamental varieties)

*Cotoneaster* spp and varieties

*Cytisus* spp and varieties (*C. scoparius* is native)

*Forsythia* spp and varieties

*Juniperus communis* (native)

*Laurus nobilis*

*Lavandula* spp and varieties

*Mahonia* spp and varieties

*Prunus padus* (native)

*Pyracantha* spp and varieties

*Rosmarinus officinalis*

*Sambucus nigra* (native – some good ornamental varieties)

*Skimmia japonica*

*Ulex* spp (native)

## Hedgerows

We British love to demarcate our land. In this we differ from many other nations. We fence and wall, ditch and dyke, but most of all we hedge, in the lowlands especially. And we are really good at it. Whole books have been written about hedges<sup>12</sup>; we have laws protecting them such as the Hedgerows Regulations (1997) and we have devised protocols for evaluating them such as the Hedgerow Evaluation and Grading System or HEGS.

The hedge is an opportunity bar none for bringing native woodland edge wildlife to our gardens. It is also a place for an occasional tree, if you have room. The trees will add habitat at a higher level,

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<sup>12</sup> Perhaps the most comprehensive is Pollard, E. Hooper, M. D. & Moore N. W. (2009). *Hedges*. Collins New Naturalist Series 58, Collins, London, UK.

## *In Horto Feritas*

providing roosting and nesting sites for bats and birds, food and microhabitats for invertebrates and a substratum for corticolous lichens and bryophytes, all of which will colonise by themselves. Our native trees are the host plants for several hundred invertebrate species.

We have so many native woody species that are adapted to management as hedgerow plants that there is really no need to think about exotics, some of which are positively unwelcome and look entirely out of place when used as hedges. I am thinking here of that cupressaceous tribe of alien conifers referred to generically, not infrequently with a shudder or sometimes downright loathing, as “*leylandii*”. I would urge avoidance of these and their kin unless you are next to a railway or motorway when their rapid growth, height, density and sound attenuation properties override all else. If you want an evergreen hedge in other circumstances, use the natives holly or yew, or perhaps autochthonous privet *Ligustrum vulgare* if you are on chalk or limestone: they will be slower to establish but so worth the wait. Alternatively, consider beech or pedunculate oak as they will retain their leaves through winter as a screen when clipped to form a hedge.

Hedges of different types are loosely referable to several National Vegetation Classification assemblages phytosociologically, depending on their species composition, but the majority in the British lowlands are likely to relate broadly to W21/W22 *Crataegus monogyna* – *Hedera helix* and *Prunus spinosa* – *Rubus fruticosus* scrubs, represented within medio-European rich-soil thickets in Palaeartic Habitat 31.81<sup>13</sup>. As the names suggest, hawthorn, blackthorn, ivy and bramble are often abundant, dominant or co-dominant.

Once established, ground flora of the woodland edge will colonise, helped, perhaps, by your scattering a little native woodland seed

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<sup>13</sup> Devillers, P. and Devillers-Terschuren, J. (1996). *A classification of Palaeartic habitats - Nature and environment* № 78. Council of Europe Publishing, Strasbourg, France.

## *In Horto Feritas*

mix containing species such as bluebell *Hyacinthoides non-scripta*, common dog-violet *Viola riviniana*, dog's mercury *Mercurialis perennis*, garlic mustard *Alliaria petiolata*, germander speedwell *Veronica chamaedrys*, greater stitchwort *Stellaria holostea*, herb-Robert *Geranium robertianum*, hedge-bedstraw *Galium mollugo*, lesser celandine *Ranunculus ficaria*, lily-of-the-valley *Convallaria majalis*, nettle-leaved bellflower *Campanula trachelium*, red campion *Silene dioica*, upright hedge-parsley *Torilis japonica*, wood anemone *Anemone nemorosa*, woodruff *Galium odoratum*, wood-sorrel *Oxalis acetosella*, wood spurge *Euphorbia amygdaloides*, wood vetch *Vicia sylvatica* and yellow archangel *Lamiastrum galeobdolon*. Some of these you may be better obtaining as bulbs (bluebell), corms (wood anemone), rhizomes (lily-of-the-valley) or plug plants from reputable growers.

Hedgerows along your boundary should, I feel, be the exclusive territory of native species. Depending on your soil, as well as those mentioned above which I have repeated in the list I am about to give, they should contain as many as possible of the following, one or two of which you could allow to grow up as trees if you have room. "Lay" the species that form their woody backbone, (see photograph on page 64) to avoid gaps and maintain structure,

*Acer campestre* field maple

*Alnus glutinosa* alder

*Carpinus betulus* hornbeam

*Cornus sanguinea* dogwood

*Corylus avellana* hazel which may attract dormice depending where you are located and whether your hedge is well connected (ecologically rather than socially)

*Crataegus monogyna*, *C. laevigata* hawthorn, Midland hawthorn

*Euonymus europaeus* spindle

*Fagus sylvatica* beech

*Frangula alnus* alder buckthorn

*Fraxinus excelsior* ash

*Ilex aquifolium* holly

*Ligustrum vulgare* wild privet

## *In Horto Feritas*

*Malus sylvestris* crab apple

*Quercus robur*, *Q. petraea* pedunculate and sessile oak

*Rosa canina* agg. dog rose

*Sambucus nigra* elder

*Sorbus aucuparia*, *S. aria*, *S. torminalis* rowan, common whitebeam  
and wild service-tree

*Taxus baccata* yew

*Tilia cordata* small-leaved lime

*Ulmus glabra* wych elm

*Ulmus procera* English elm (resists Dutch elm disease if kept cut as  
hedge with small-diameter trunks)

*Viburnum opulus*, *V. lantana* guelder-rose, wayfaring-tree

... and don't forget the various *Prunus* species (the natives *P. avium*, *P. padus*, *P. spinosa* wild cherry, bird cherry and blackthorn plus perhaps one or two of the widely naturalised ones such as *P. domestica* wild plum whose well-known subspecies *insititia* is the damson, or *Pyrus pyraeaster* the wild pear).

Then add some twiners such as honeysuckle *Lonicera periclymenum*, hop *Humulus lupulus*, ivy *Hedera helix* and traveller's-joy *Clematis vitalba*.

Keep your hedge cut no more than once a year (unless formal such as yew) and do it outside the bird nesting season. Various shapes are used for clipping hedges – perpendicular sides and flat top like a box, an “A” shape, wide top and narrower base and *vice versa* as:



Remember that, if you want berries on species such as hawthorn which bear fruit on the previous season's growth, you will need to cut those on alternate years, perhaps one side one year and the other the next.

## *In Horto Feritas*



Section of a newly-laid native hedgerow. Note the upright support stakes around which stems are woven, and that the laid live woody stems are only partly severed to ensure they are not killed.



A large, unmanaged, mature native hedge: excellent for wildlife but much too large for most gardens. Judicious clipping and pruning in autumn/winter over two or three years, retaining the one main tree, will reduce it to a suitable size with minimum loss of wildlife value.

## *In Horto Feritas*

### CHAPTER 9 TREES — ORNAMENTAL AND FRUIT

“*Par ses fruits, par ses fleurs, par son beau vêtement,  
L’arbre est de nos jardins le plus bel ornement :  
Pour mieux plaire à nos yeux combien il prend des formes !*”  
Jacques Delille *Les Jardins, en quatre chants* (1780).

Within the garden, rather than peripherally where I have suggested some native species within the boundary hedgerow if you have room, you may be able to accommodate a few smaller trees. Generally, you will want these to be *beaux ornements*, or comestibly productive, or both. Small trees that are catholic in their edaphic and other ecological needs are numerous. I suggest some below that will particularly benefit wildlife, but remember that many larger varieties and species not listed here, especially fruit trees, are available grafted onto dwarfing or semi-dwarfing rootstocks, so even those can be employed within smaller gardens.

*Acer* spp and varieties. Several smaller maples are very beautiful and produce abundant seed which is eaten by birds and small mammals. Keep large species like sycamore *A. pseudoplatanus* to the boundary hedge, though, and be aware that it and the Norway maple *A. platanoides* are invasive, even if the latter is stunning in autumn.

*Amelanchier lamarckii* the juneberry or snowy mespilus — lovely small trees with masses of spring blossom followed by berries that birds love and good autumn colour.



The delicately pretty flowers of *Amelanchier lamarckii*

*Arbutus unedo* strawberry tree. An ericaceous species that is happy in alkaline soil. *A. menziesii* is similar but with attractive flaky bark. These evergreen small trees flower and fruit prolifically when happy.

*Betula* spp and varieties. Many birches, especially horticultural varieties of the native *B. pendula* and *B. pubescens*, are attractive, relative small, easy and quick to establish, very hardy and good for wildlife.

## *In Horto Feritas*

*Cornus kousa* ‘Satomi’, *Cornus mas* and other flowering dogwoods, all are attractive and some have excellent early nectar/pollen.

*Crataegus* spp and cultivars. The hawthorns come in many garden varieties and a large proportion produce abundant flowers and berries. Select ones that have open flowers and that are prolific in fruit such as *C. laevigata* which is native (Midland hawthorn) but whose horticultural variety ‘*Punicea*’ has red flowers.

*Cydonia oblonga* – quinces have large open and very attractive flowers plus long-lasting fruits.

*Ilex* hybrids and varieties. Choose hollies with plenty of berries which are good food for birds in winter, especially after frosts have lowered their toxicity. You might consider *Ilex x altaclerensis*, ‘Van Tol’, ‘Amber’, ‘*Bacciflava*’ or ‘*Pyramidalis*’ (self-fertile) which have berries of various shades. Avoid the sterile male hedgehog types unless you are creating protective prickly pockets for nesting.

*Koelreuteria paniculata*, the golden rain tree – delightful, easy, masses of flowers to attract insect pollinators, and seeds that are edible, attracting wildlife.

*Prunus*, *Pyrus* and *Malus* – there is a large range of flowering and fruiting small trees in these genera, including cherries, plums, peaches, nectarines, almonds, apples and pears. Use dwarfing stock for the larger cherries, plums, apples and pears. Many have very early flowers of importance for winter nectar – protect such flowers with fleece during frosty nights, though, if you want a good fruit crop.

*Salix* smaller spp (willows) – the native pussy or goat willow *S. caprea*, familiar to everyone, has good early pollen but the black pussy willow from Japan is arguably more striking. Remember willows are dioecious (see below) and you need a male



*Salix gracilistyla* ‘*melanostachys*’ the black pussy willow

## *In Horto Feritas*

tree for the pollen, although female catkins contain three times as much nectar.

*Sorbus* spp and varieties. Many of these are small, trouble-free and have fruit attractive to wildlife.

### Sex and death

It is worth thinking about sex, well it usually is, but some trees (hollies, willows and ashes for example), as with many other plants, are dioecious, that is they have male and female flowers on separate trees, so if you want the fruit, you'll need a male around somewhere as well as the females. Sexual selection has promoted the evolution of differences in flowering of male and female plants and it is theorised that the reproductive success of males is generally limited by the number of mates, whilst for females it is constrained by the resources available to be invested in producing fruit. It follows that competition between males will be likely to result in their earlier and longer flowering (phenology tends to confirm this), but which will be later and shorter in females, so that the former have the best chance of passing on their genes whilst the latter can make optimal use of resources for fruit production.

Dioccy is the subject of much research but, as indicated above, Darwinian theory suggests it has evolved to allow female plants to invest greater resources in producing large seeds and fleshy fruit or some other seed quality that will be reproductively more successful. It also avoids in-breeding to assure genetic diversity and perhaps reduces seed predation because only half the plants will produce seed, introducing serendipity for foragers.

Having thought about sex, death is next. All trees are potential sources of dead wood, so before you cut out those moribund branches, stumps, snags, hollows and splits, spare a thought for the many saproxylic invertebrates that feed on rotting timber and the birds and others that eat them. Standing dead wood and defects such as cracks and sap runs or “seeps” harbour many organisms –

## *In Horto Feritas*

microbes and fungi as well as invertebrates. Leave them be if you can, or make a pile of dead branches and logs in an out-of-the-way corner where the decomposers and processes of decay can do their bit for life's ecological recycling, the only true resurrection. Your reward in this world will be a great richness in the biodiversity of your garden.

Standing  
dead wood



### Shade

Trees, as well as shrubs and hedgerows, provide shady habitats beneath them, the domain of umbricolous taxa such as ferns, mosses, liverworts and specialised flowering vascular plants. Garden



Hart's-tongue *Asplenium scolopendrium* – this native fern is happy in moist gravel at the side of a path in the shade of a wall.

buildings, the main house and other structures will also provide shady nooks and corners. Don't be put off. Although these are not places for a heliophytium, they are an opportunity to create a *coin de charme* in which to

grow a fascinating collection of delightful plants, many of which offer wildlife benefits, unavailable elsewhere in the garden, within their cooler, often moister microclimate.

## *In Horto Feritas*



Mosses like shade under hedges that simulates woodland – this group contains *Polytrichum commune*, *Mnium hornum*, *Thuidium tamariscinum*, *Brachythecium rutabulum* and *Kindbergia praelonga*.

The bryophytes (mosses and liverworts) will usually colonise by themselves, but you can assist them by adding a few mossy rocks, dead branches or stumps to the shady area you want to enrich. Many mosses, but less so liverworts, will tolerate dry conditions for a time. Ferns are the food of fewer invertebrates than many other plants, probably because of toxic secondary metabolites,

but several species of bugs, saw-flies, true flies and moths are associated with them. Male-fern *Dryopteris filix-mas*, broad buckler-fern *D. dilatata*, lady-fern *Athyrium filix-femina*, hard fern *Blechnum spicant*, hard shield-fern *Polystichum aculeatum* and hart's-tongue *Asplenium scolopendrium* are worth trying. Bear in mind that some are choosy about whether there is lime in the soil.

You can have great fun propagating ferns from spores, and mosses for that matter. Collect fronds with ripe spores and lay them, sporocarps down, on clean paper to collect the spores or directly on the soil surface. Sow on the surface of sterile, peaty, low-nutrient compost in pots or seed trays and put them in a shady place, never letting them dry out – keep under a sheet of glass or in a clear polythene bag. Eventually a green film will appear – a prothallus for ferns or a protonema in mosses – and then tiny plants which you can transplant when large enough.

Turning to flowering plants, here are some native woodlanders, many of which flower early, before the leaves on deciduous trees, shrubs and hedgerows create very dense shade. I have mentioned some of them earlier in the section about hedgerows – several have horticultural varieties that are also good for wildlife:

## *In Horto Feritas*

*Ajuga reptans* bugle  
*Anemone nemorosa* wood anemone  
*Arum maculatum* lords-and-ladies  
*Calamagrostis epigejos* wood small-reed  
*Campanula trachelium* nettle-leaved bellflower  
*Carex pendula* pendulous sedge  
*Carex sylvatica* wood-sedge  
*Convallaria majalis* lily-of-the-valley  
*Daphne laureola* spurge-laurel  
*Daphne mezereum* mezereon (the daphnes like lime)  
*Digitalis purpurea* foxglove  
*Euphorbia amygdaloides* wood spurge  
*Galium mollugo* hedge-bedstraw  
*Galium odoratum* woodruff  
*Geranium robertianum* herb-Robert  
*Geranium sylvaticum* wood crane's-bill (Scotland and the north)  
*Geum urbanum* wood avens  
*Hordelymus europaeus* wood barley  
*Hyacinthoides non-scripta* bluebell  
*Lamiaeum galeobdolon* yellow archangel  
*Lamium album* white dead-nettle  
*Lamium purpureum* red dead-nettle  
*Luzula sylvatica* great woodrush  
*Melica uniflora* wood melick  
*Mercurialis perennis* dog's mercury  
*Milium effusum* wood millet  
*Narcissus pseudonarcissus* wild daffodil  
*Oxalis acetosella* wood-sorrel  
*Primula vulgaris* primrose  
*Ranunculus ficaria* lesser celandine  
*Silene dioica* red campion  
*Stellaria holostea* greater stitchwort  
*Torilis japonica* upright hedge-parsley  
*Veronica chamaedrys* germander speedwell  
*Vicia sylvatica* wood vetch  
*Viola odorata* sweet violet  
*Viola riviniana* common dog-violet

## *In Horto Feritas*

### CHAPTER 10 ROCKERIES, WALLS AND PAVING

*“The rock garden offers peculiar attractions to the amateur. It can be made in limited space, and the owner of quite a small garden obtains an immense amount of pleasure from its flowers.”*

H.H. Thomas (Ed.) *Gardening for Amateurs*. 1920.

This is the exciting domain of the saxicole. There is an almost limitless variety of habitats you can make with rocks and stony materials of one kind or another – rockeries and rocky banks and dells, dry stone walls, crazy or formal paving with planting spaces, screes, gravel gardens and moraines. As well as the plants, such places provide shelter for many small animals.

Lapidicolous plants, many of which I have also listed in Chapter 4 when discussing green roofs, have evolved to be able to survive many insults: drought, exposure, trampling, lack of nutrients and very unfriendly substrata when it comes to putting down roots. These plants usually have one or several adaptations such as reduced leaf stomata, waxy cuticles, dense spines or hairs (trichomes), enhanced water storage in leaves, stems or roots, or particular root morphology to assist anchorage or exploit interstitial crevices. Above all, though, most of them flower as if there is no tomorrow – masses and masses of flowers to delight every taste in a rainbow of colours, a profusion that attracts an equally abundant and diverse invertebrate fauna to pollinate them.

Whilst there are a few shade-lovers, most saxicolous flowering plants are heliophytes, coming from high altitudes exposed to above average insolation – worth remembering when you are deciding where to place this kind of garden habitat. As long as they have really sharp drainage, saxicoles are usually very tough, the exception being those of lesser frost resistance that you may choose to plant on a south or west facing wall for protection: I am here thinking more of a dry stone or similar wall you might create in the garden beyond the house itself.

## *In Horto Feritas*

For the purist, there are several lapidicolous semi-natural native vegetation communities identified by the National Vegetation Classification. Most of these are from the high altitudes of Scotland. Ignoring those and simplifying somewhat, I have identified five communities to offer you with some ideas. Note that there is a large constituent of flowerless plants. These are the bryophytes – with such evocative vernacular names – lichens and saxicolous ferns, a group that is of great importance in these habitats, being able to thrive on rocks and in crevices where little else can. There are important separations between what will grow on siliceous rocks, the acidophiles, and on limestone, the calcicoles.

### 1. Acidophilous Scree Community

*Barbilophozia floerkei* common pawwort  
*Campylopus flexuosus* rusty swan-neck moss  
*Cryptogramma crispa* parsley fern  
*Deschampsia flexuosa* wavy hair-grass  
*Dicranum scoparium* broom fork-moss  
*Diplophyllum albicans* liverwort (white earwort)  
*Festuca ovina* sheep's fescue  
*Galium saxatile* heath bedstraw  
*Huperzia selago* fir clubmoss  
*Hypnum cupressiforme* cypress-leaved plait-moss  
*Lophozia ventricosa* liverwort (tumid notchwort)  
*Nardus stricta* mat-grass  
*Oxalis acetosella* wood-sorrel  
*Pleurozium schreberi* red-stemmed feather-moss  
*Polytrichastrum formosum* bank haircap  
*Racomitrium lanuginosum* woolly fringe-moss  
*Vaccinium myrtillus* bilberry

This assemblage typically occurs on siliceous rocky, sub-montane scree in the oceanic north and west of Britain. It may develop on anthropogenic substrata such as walls in these areas if they are suitably acidic and it is therefore of some interest for naturalistic landscaping in gardens in appropriate locations. I would recommend that parsley fern be established as a first stage, in order to provide

## *In Horto Feritas*

the protective microclimate for the associated bryophytes. The habitat conditions should be moist and not too exposed to bitter cold. This is the *Cryptogramma crispum* – *Deschampsia flexuosa* community, U21 of the National Vegetation Classification; it is referable to Natura 2000 habitats siliceous scree (8110) or siliceous rocky slopes with chasmophytic vegetation (8220).

### 2. Calcareous Rock-Face Community



Maidenhair spleenwort *Asplenium trichomanes* with saxicolous mosses growing in a crevice in a dry stone wall.

*Arenaria serpyllifolia* thyme-leaved sandwort

*Asplenium ruta-muraria* wall-rue

*Asplenium trichomanes* maidenhair spleenwort

*Asplenium trichomanes-ramosum* green spleenwort

*Cladonia pocillum* rosette pixie-cup lichen

*Ctenidium molluscum* chalk comb-moss

*Cystopteris fragilis* brittle bladder-fern

## *In Horto Feritas*

*Encalypta streptocarpa* spiral extinguisher-moss  
*Festuca ovina* sheep's fescue  
*Fissidens dubius* rock pocket-moss  
*Helianthemum nummularium* common rock-rose  
*Homalothecium sericeum* silky wall feather-moss  
*Hypnum cupressiforme* cypress-leaved plait-moss  
*Koeleria macrantha* crested hair-grass  
*Porella platyphylla* liverwort (wall scalewort)  
*Sedum acre* biting stonecrop  
*Thymus polytrichus* wild thyme  
*Tortella tortuosa* frizzled crisp-moss  
*Trichostomum crispulum* curly crisp-moss  
*Weissia controversa* green-tufted stubble-moss

This limestone community occurs predominantly in the more oceanic climate of the north and west but usually not at very high altitudes. It is an open assemblage of often vertical base-rich stone and rocks, dominated by ferns and bryophytes. Walls constructed of limestone may provide an anthropogenic substratum for it elsewhere. It is referable to National Vegetation Classification communities *Asplenium trichomanes* – *Asplenium ruta-muraria* (OV39, formerly U22) and *Asplenium viride* – *Cystopteris fragilis* (OV40, formerly U23), Natura 2000 habitat code 8210 (calcareous rocky slopes with chasmophytic vegetation).

### 3. Limestone Fern Scree Community

*Arrhenatherum elatius* false oat-grass  
*Brachypodium sylvaticum* false brome  
*Calliergonella cuspidata* pointed spear-moss  
*Carex flacca* glaucous sedge  
*Cladonia pocillum* rosette pixie-cup lichen  
*Ctenidium molluscum* chalk comb-moss  
*Dicranum scoparium* broom fork-moss  
*Festuca ovina* sheep's fescue  
*Festuca rubra* red fescue  
*Fissidens dubius* rock pocket-moss  
*Galium sterner* limestone bedstraw

## *In Horto Feritas*

*Geranium robertianum* herb-Robert  
*Grimmia apocarpa* sessile grimmia  
*Gymnocarpium robertianum* limestone fern  
*Homalothecium sericeum* silky wall feather-moss  
*Hylocomium splendens* glittering wood-moss  
*Hypnum cupressiforme* cypress-leaved plait-moss  
*Mercurialis perennis* dog's mercury  
*Mycelis muralis* wall lettuce  
*Neckera crispa* crisped neckera  
*Origanum vulgare* marjoram  
*Oxalis acetosella* wood-sorrel  
*Teucrium scorodonia* wood sage  
*Tortella tortuosa* frizzled crisp-moss  
*Viola riviniana* common dog-violet

A local, calcicolous vegetation type of rocky places and scree scattered through limestone areas, mostly in north-west England, the Peak District and parts of Wales but not much above 500m altitude. Limestone fern is nationally scarce and worth encouraging with this community if suitable habitat can be made available. This is the *Gymnocarpium robertianum* – *Arrhenatherum elatius* community (OV38, formerly U24) of the National Vegetation Classification and it is a Natura 2000 habitat type, code 8120 calcareous and calcshist screes, closely related to 8210 dry to moist calcareous rock and rock faces with their chasmophytic vegetation (the *Potentilletalia caulescentis*).

### 4. Wall Pellitory Community

*Centaurea scabiosa* greater knapweed  
*Dactylis glomerata* cock's-foot  
*Daucus carota* wild carrot  
*Euphorbia portlandica* Portland spurge  
*Festuca rubra* red fescue  
*Hedera helix* ivy  
*Homalothecium sericeum* silky wall feather-moss  
*Parietaria judaica* pellitory-of-the-wall  
*Plantago coronopus* buck's-horn plantain

## *In Horto Feritas*

*Plantago lanceolata* ribwort plantain  
*Sanguisorba minor* ssp. *minor* salad burnet  
*Tortula muralis* wall screw-moss

This saxicolous community establishes on cliffs, walls, dry stony hedge banks and other similar places, frequently by the sea for those of you in such localities, but not in the far north and west. It is commonly dominated by pellitory-of-the-wall but both cover and species-richness are rather variable. There are many other associates of low cover and frequency in addition to the main species I have listed above. As well as the nationally scarce coastal species Portland spurge, noted above, the Red Data Book species yellow whitlowgrass *Draba aizoides* has been recorded in this community. The assemblage appears in the National Vegetation Classification weed section communities and other vegetation types of open habitats as the *Parietaria judaica* community (OV41) which identifies two sub-communities (*Homalothecium sericeum*-*Tortula muralis* and *Daucus carota*). It is within Palaeartic Habitat 62 (inland cliffs and exposed rocks). It is not a Natura 2000 habitat type.

### 5. Ivy-Leaved Toadflax Saxicolous Community

*Asplenium ruta-muraria* wall-rue  
*Cymbalaria muralis* ivy-leaved toadflax  
*Grimmia apocarpa* sessile grimmia  
*Grimmia pulvinata* grey-cushioned  
grimmia  
*Homalothecium sericeum* silky wall  
feather-moss  
*Poa annua* annual meadow-grass (beware  
– see note in text below)  
*Sedum acre* biting stonecrop  
*Tortula muralis* wall screw-moss



Ivy-leaved toadflax *Cymbalaria muralis*

This is an open community typical of old, chemically basic walls and occasionally other rocky or stony places.

## *In Horto Feritas*

It occurs throughout most of Britain on suitable substrata. It is usually rather species-poor but there are many occasional associates all of which I have not listed but including the vascular plants thyme-leaved sandwort *Arenaria serpyllifolia*, common polypody *Polypodium vulgare*, maidenhair spleenwort *Asplenium trichomanes*, rue-leaved saxifrage *Saxifraga tridactylites*, common cornsalad *Valerianella locusta*, yarrow *Achillea millefolium*, hedge bindweed *Calystegia sepium*, fern-grass *Catapodium rigidum*, little mouse-ear *Cerastium semidecandrum*, and smooth hawk's-beard *Crepis capillaris*.

Ivy-leaved toadflax itself was introduced into Britain in the seventeenth century and is now widespread. This community is probably the one most people will see occurring naturally on old limestone walls as it establishes readily in appropriate places but I suggest avoiding *Poa annua* if you can as it gets everywhere and is a real nuisance in gardens.

This assemblage appears in the National Vegetation Classification vegetation types of open habitats as the *Cymbalaria muralis* community (OV42), again within Palaeartic Habitat 62 (inland cliffs and exposed rocks) and is not a Natura 2000 habitat type.

Of course, most of us will want to add species and varieties from the wealth of alpine gems gardeners have imported or bred over the centuries. The lists above will give you some ideas for native species but below are some others to consider that are known to be attractive for their nectar-rich flowers.

*Allium karataviense*, *A. ostrowskianum* and other dwarf onions

*Alyssum* spp and varieties

*Arabis alpina* ssp. *caucasica* rock cress

*Armeria maritima* thrift – various cultivars such as ‘*Rubrifolia*’

*Aubrieta* (note spelling, after Claude Aubriet) spp and varieties

*Aurinia saxatilis* gold-dust

*Buddleia* – choose the dwarf ‘Low and Behold Blue Chip’

*Campanula carpatica* and other smaller bellflowers

## *In Horto Feritas*

*Crocus* spp and varieties

*Dianthus* – single pinks e.g. forms of *D. plumarius* or *D. caesius*

*Eranthis hyemalis* and *E. cilicicus* winter aconites

*Erysimum cheiri* Aegean wallflower varieties such as ‘Bowles Mauve’

*Galanthus nivalis* snowdrop

*Helianthemum* – many colours and varieties of rock-roses

*Iberis* spp and varieties – candytufts

*Lobularia maritima* sweet alyssum

*Mentha* spp and varieties – some mints can “run” so restrict roots

*Muscari* spp and varieties – grape hyacinths

*Origanum* spp and varieties oregano/marjoram >70 to choose from

*Phlox subulata* moss pink

*Rosmarinus officinalis* – there are some smaller creeping rosemaries

*Saxifraga oppositifolia* purple saxifrage and others in this genus

*Sedum* – smaller spp and varieties e.g. ‘Vera Jameson’

*Thymus* spp and varieties – thymes

*Trifolium* rockery varieties – choose clovers that are free-flowering

*Umbilicus rupestris* navelwort – native to western Britain

*Viola* spp and varieties

As I have noted before, flowerless plants such as bryophytes and lichens will usually colonise naturally from propagules in the air, on birds and other animals or amongst imported materials. Nitrophilous lichens such as the familiar *Xanthoria parietina*, which is bright yellow in insolated situations, grow where there are nitrogen inputs to the substratum such as bird droppings and can be encouraged by painting stones with a liquid fertilizer or manure, I believe, although I have not tried it.

You can employ big logs as seats and they will be good habitat, too. Old railway sleepers or telegraph posts whose surfaces have lost their phytotoxicity are also useful for all kinds of surface structures such as bed edges and steps. They will last a long time and provide shelter and protection for fauna beneath them.

## *In Horto Feritas*

### Animals under stones

The particular habitat under stones, rocks, logs and the like provides a niche for a variety of specialised animals. If you are studying or just want to observe these, lift the object carefully and always replace it equally carefully. If you have an endoscope with a flexible fibre optic probe of the kind used for bat surveys or looking inside complex machinery, you may be able to use this, where there are accessible spaces, without disturbing the habitat or if the rock is too heavy. Some of them attach to a camera.

Examples of the larger fauna in this community are amphibians in their terrestrial phase, especially newts & toads, beetles, true flies, cockroaches, earwigs, springtails, centipedes & millipedes, woodlice, spiders & harvestmen, slugs & snails, and earthworms of course. It is interesting and often revealing to record and classify them into predators, herbivores, decomposers, *etc.*



Three animals commonly found under stones (clockwise from top left): the grey-white variety of the slug *Arion ater* (Linnaeus, 1758) which is more usually jet black and may grow to 15cm long; the devil's coach horse (a predatory staphylinid rove beetle) *Ocyopus olens* (Müller, 1764) that may reach 30mm in length; the garden snail *Helix aspersa* (Müller, 1774) which has a shell about 25–35mm high.



## *In Horto Feritas*

### CHAPTER 11 POOLS, PONDS AND WATER (MARSH & BOG)

*“Right the way throughout the ages people have felt the need of water in the garden.”*

W.E. Shewell-Cooper MBE, Chevalier du Mérite Agricole. 1949.

Water features of one kind or another are perhaps the elements of the garden associated with the greatest variety of wildlife – in it, on it, above it, around it, water is home to a huge array of aquatic life, where there is a whole microscopic world in a teaspoon-full, and a magnet for those animals who come to drink, swim, wash and feed. Whether a small sunken tub or a more elaborate project with pond, island, marsh and waterfall or stream, I urge you to include water in your garden plan for the richness of the wildlife it will attract from the spectacular (dragonflies, bats) to the minute (microscopic PROTOZOA).

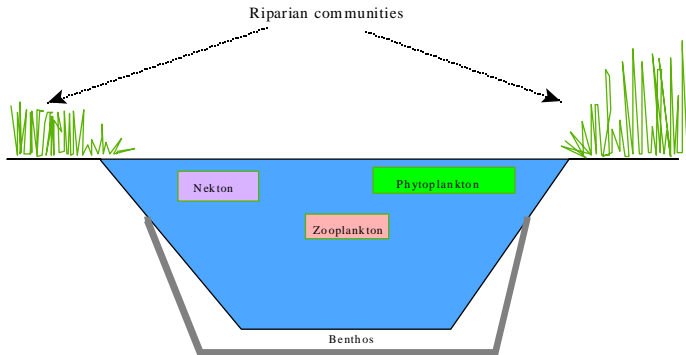
Phytosociologically, the National Vegetation Classification defines fifty-two types of British aquatic communities including swamps and tall-herb fens, and that is without mires, wet heaths or salt-marsh which account for several dozen more! We live in a wet land.

Aquatic vegetation in the wild tends to be relatively species-poor and often has just one or two major dominants. There are many critical factors which contribute to variation in aquatic community plant species composition. These include temperature, depth, levels of nutrients and other solutes, turbidity and flow rate (or lack of it) of the water. The amount of light reaching the water surface, the type of substratum and degree of (human) disturbance are also important. For lentic open water habitats in the garden, ponds that is, these factors also should be borne in mind.

The diagram below indicates the broad divisions ecological scientists use when considering the biotic communities of a pond. It is useful to think of the pond ecosystem in this way when examining how life makes use of the various niches a pond offers. Animals that just

## *In Horto Feritas*

visit a pond briefly, to drink or hunt for example, are regarded as temporary members of the nekton.



Ecological terms for pond communities (the nekton is the assemblage of actively swimming organisms in the water body)

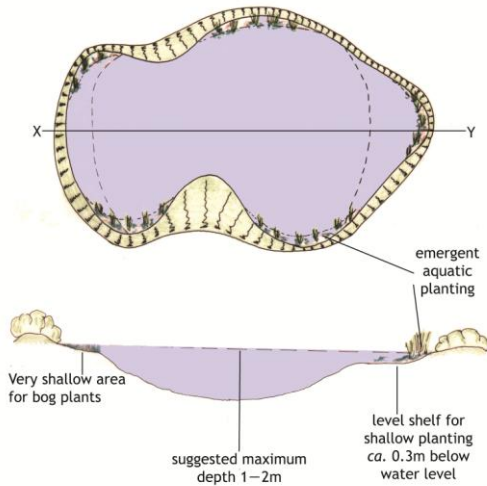
For most gardens, the pond will be a mixture of the decorative plants you want to grow in it and the native invertebrates and other animals that colonise it by themselves, plus perhaps some fish, although you should note that fish do not mix very well with newts if you want these delightful amphibians to breed in your pond.

Do please think very carefully about what you are going to plant as several aquatic species are real thugs. I made the mistake of putting water soldier *Stratiotes aloides* in my main pond: it took over completely and has proved nigh-on impossible to eradicate without digging the whole site out. If you are not sure about an aquatic plant, check it out carefully before you add it to your pond as it may be an action difficult to reverse.

Let us consider creating a wildlife pond of native species that will attract amphibians and provide the conditions they need to breed. Below is a sketch design for a simple informal pond that would be

## *In Horto Feritas*

good for native amphibians if you don't introduce fish. There is plenty of information readily available about pond construction and detailed techniques are beyond the intended scope of this book. I have found puddled clay the best if you live in a clayey or marl area, but perhaps the easiest way to start in a garden is with one of the pre-formed plastic ones that are simply sunk into a prepared pit.



Native plants that should do well in such a pond are:

*Alisma plantago-aquatica* water plantain (M)

*Alopecurus geniculatus*\* marsh foxtail (M)

*Apium nodiflorum*\* fool's water-cress (M)

*Callitriche stagnalis* common water-starwort

## *In Horto Feritas*

*Caltha palustris* marsh marigold (M)



The well-loved spring flowers of the waterside *Caltha palustris* marsh marigold

*Carex riparia* greater pond-sedge (not for very small ponds – use smaller sedges) (M)

*Ceratophyllum demersum* rigid hornwort

*Epilobium hirsutum*\* great willow-herb (can be rather invasive) (M)

*Glyceria fluitans*\* floating sweet-grass (M)

*Iris pseudacorus* yellow iris (M)

*Juncus effusus* soft rush and other *Juncus* spp (M)

*Mentha aquatica*\* water mint (M)

*Myosotis laxa* ssp. *caespitosa*\* tufted forget-me-not (M)

*Myosotis scorpioides*\* water forget-me-not (M)

*Myriophyllum spicatum* spiked water milfoil

*Nasturtium officinale*\* water-cress

*Nuphar lutea* yellow water-lily (deeper areas only – big ponds)

*Persicaria amphibia* amphibious bistort (M) and other *Persicaria* spp

*Potamogeton* spp pondweeds

*Ranunculus aquatilis* water crow-foot

*Veronica beccabunga*\* brooklime (M)

For some others, please see Appendix III. Asterisks \* denote plants on which newts are known to lay their eggs; M = marginal/emergent

## *In Horto Feritas*

plants (although some also grow as full aquatics). I have not suggested plants such as bulrush *Typha* spp, common reed *Phragmites australis*, white water-lily *Nymphaea alba* and a few other robust spreading species as they are really too large for most garden ponds. As it is, you will almost certainly have to control pond vegetation every winter once established - reducing cover by 25% is a reasonable rule of thumb.

Turning to the use of exotics in the water garden, there is as usual a large and exciting choice. Always bearing in mind that several exotic water plants have become an invasive menace, here are a few ornamentals that grow out in the open water and are fully aquatic (A) or in the wet margins (M) that are colourful/interesting and worthwhile:

*Aponegeton distachyos* cape-pondweed (A)

*Dodecatheon* spp shooting stars (M)

*Calla palustris* bog arum (M)

*Dracocephalum* spp dragonheads – good in moist soil if sheltered and well-lit (M)

*Houttuynia cordata* chameleon plant (M)

*Hydrocleis nymphoides* water poppy – sadly not winter hardy but worth protecting if you can (A)

*Iris* varieties – many like wet places (M)

*Mimulus* spp monkey flower – colourful floriferous marginals (M)



*Mimulus luteus* agg. blood-drop-emlets naturalised by a stream.

## *In Horto Feritas*

*Nymphaea* horticultural varieties – there are many lovely water-lilies, some for tiny ponds (A)

*Pontederia cordata* pickerel plant (M)

*Primula* spp and varieties – many like damp places. (M)

*Saururus cernuus* lizard's tail (M)

If you are able to create a small stream, run by a solar pump say, then you will be able to increase the variety of aquatic invertebrates that live in a lotic, well-oxygenated aquatic habitat, such as several mayflies, stoneflies, damselflies, water beetles, *etc.*

For the more adventurous, a bog garden where insectivorous plants will grow in the wet, low-nutrient, mossy conditions is a fascinating project, challenging but by no means impossible as many nurseries now stock hardy insectivorous species and provide full growing instructions.



*Drosera rotundifolia* round-leaved sundew growing in *Sphagnum*. This native plant is available from specialist nurseries but it requires boggy, acid, low nutrient conditions.

## *In Horto Feritas*

### CHAPTER 12 UTILITY AREAS — THE COMPOST HEAP, WEEDY PLACES & HABITAT CORNERS

*“... Strength may wield the ponderous spade,  
May turn the clod, and wheel the compost home;  
But elegance, chief grace the garden shows,  
And most attractive, is the fair result  
Of thought, the creature of a polish’d mind.”*

William Cowper *The Garden*. 1785.

Every garden needs a service area – a corner out of the way to keep the wheelbarrow, logs for the fire perhaps, a compost heap, a little horse manure from a friendly stables, recycling space in the biological sense, and old bricks and building bits. Here is a place where a few nettles, a thistle or two and other weeds banned from the main garden could be allowed without guilt. For much wildlife, such areas are paradise.

The compost heap is an ecosystem of decomposers, led by the bacteria and fungi, catabolising complex organics to simpler fare and ultimately a soft brown topping for elsewhere in the garden. This crumbling mound is rich a hunting ground for birds such as robins and thrushes, and smaller predators (centipedes, rove and carabid beetles, ants, predatory mites and the rest). Manure is a feast to have made Tigellinus proud had he been preparing for coprophages. Dung, of course, is always interesting to biologists and gardeners, and thus doubly so to those who combine life study with horticulture.

So, if you can, extend this corner a little, allow your manure and compost room to spread, be turned and mature; but let those nettles grow and add a pile of wood to be left to rot in its own time, a heap of bricks-bats and old mortar, a miscellany of sawdust, shavings, logs, broken tiles, straw, slates and sweepings from the shed quietly to sit and just become habitat for all those small animals that will be only too pleased to colonise it.

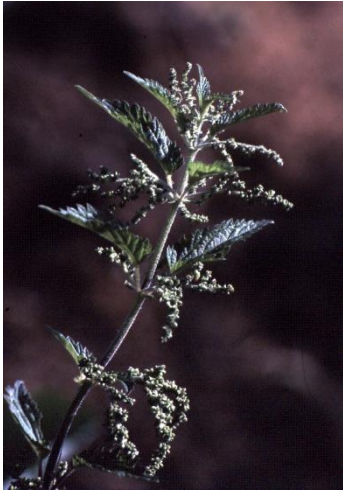
## *In Horto Feritas*



A pile of old knotty wood like this, left to its own devices in an out-of-the-way corner soon becomes a habitat of multidimensional niches for a host of decomposer organisms and their associated biotic assemblage.



The fluted bird's nest fungus *Cyathus striatus* grows on organic debris such as twigs or bark mulch.



The common nettle *Urtica dioica* is the food plant of small tortoiseshell and peacock butterflies as many people know, but dozens of other invertebrates depend on it. Let it grow in an odd corner.



The fairy ink-cap *Coprinus disseminatus* grows on rotting logs or soil near them.

## *In Horto Feritas*



A bit of waste ground can quickly become a wildflower haven. In one season, this small, disturbed patch of earth grew a magnificent crop of the scented musk thistle *Carduus nutans* with a riot of other “weeds” – nettles, yarrow, ragwort and others.

# *In Horto Feritas*

## GLOSSARY AND ABBREVIATIONS

- Acidophile -philous: liking acid conditions or an acid substratum (also calcifuge, below) – φίλος in the sense of having an affinity for).  
agg.: aggregate.
- Arthropod: member of the phylum **ARTHROPODA**, animals with jointed paired legs (άρθρον, πούς) and an exoskeleton.
- Asymptote: a straight line approached by a given curve as one of the variables in the equation of that curve approaches infinity. Thus ecology, an asymptotic population is one at carrying capacity or where the population is at maximum for the area or habitat (άσύμπτωτος)
- Benthos: organisms of the floor of a water body (βένθος).
- Biome: a major ecological community of a defined area.
- Biota: the total flora and fauna of a given area.
- Bryophytes: the plant phylum **BRYOPHYTA** – mosses and liverworts.
- Calcicole -colous: organisms living in alkaline conditions or on an alkaline substratum (*calx, colere*).
- Calcifuge -fugous: organisms avoiding alkaline conditions – *calx, fugere* (as acidophile above).
- Chasmophyte -phytic: growing in rocky crevices and fissures.
- Coprophage -phagous: feeding on dung/faecal material (κόπρος, φαγείν).
- Dioecious/monoecious: (noun dioecy, monoecy) dioecious plants have flowers of each sex on different plants whereas monoecious ones have flowers of both sexes on the same plant (words with -oecious or eco- as ecology, economy stem from the Greek οἶκος or οἰκία).
- Disclimax: an ecological succession prevented from becoming a climax stage by disturbance, activities of man, fire, etc.
- Edaphic: pertaining to, or influenced by, the nature of the soil (ἔδαφος).
- Euryoecious: tolerating a wide range of habitats and environmental conditions (opposite of stenoecious).
- Exuvia (plural exuviae): the remains of an exoskeleton after moulting such as the pupal case of, for example, a dragonfly.
- Felinogenic: produced by cats.
- Forb: broad leaved herbaceous plant (*i.e.* not grasses).
- Heliophyte: a plant thriving in full sun (ἥλιος, φυτόν).
- Heliophytium: a plant community thriving in conditions of full sun.
- Hibernaculum: hibernation/overwintering site.
- Hirundinid: a member of the **Hirundinidae** (swallows & martins).
- Iteroparity -parous: see semelparity.
- Lapicicole -colous: living on or associated with stones (as saxicole) (*lapis, colere*).
- Lentic: of still or slow-moving water bodies.
- Lotic: of fast flowing water bodies.
- Mesic: in conditions of moderate moisture.
- Mesotrophic: having intermediate levels of primary productivity and the nutrients required by green plants.

## *In Horto Feritas*

**Metabolite:** a product of metabolism – a primary metabolite is directly involved in metabolic processes whereas a secondary metabolite is not but often has an important ecological function.

**Morphology:** the (study of) form and structure of an organism (μορφή, λόγος).

**Nectariphagous:** nectar-eating (νέκταρ, φαγεῖν).

**Nekton:** the actively swimming organisms in the water column.

**Phenology:** the study of timing of natural phenomena such as flowering and the relationship to season and climate (φαίνω, λόγος).

**Phytoplankton:** microscopic plants that have no locomotion independently of the water body in which they are found.

**Propagule:** any part of an organism that is capable of giving rise to a new individual.

**Riparian:** of the bank (usually of a stream/river/pond/lake).

**Saproxyllic:** pertaining to dead or rotting wood (σαπρός, ξύλον).

**Saprophage -phagous:** feeding on dead or rotting wood (σαπρός, φαγεῖν).

**Sarcophage -phagous:** feeding on flesh (σαρξ, φαγεῖν) – carnivore, carnivorous.

**Saxicole -colous:** *saxum, colere* – living on rocks or in rocky habitats (as lapidicole).

**Semelparity -ous:** organisms having only one brood during a lifetime (as opposed to iteroparous organisms that have several).

**Stenoecious:** see euryoecious.

*s.l.:* *sensu lato* (Latin, in the broad sense).

sp., spp: species, singular and plural respectively.

**Taxon:** (plural taxa) a taxonomic group of any rank (τάξις) .

**Terricole -colous:** thriving in or on soil.

**Umbricole -colous:** thriving in shade (*umbra, colere*).

**Zooplankton:** the animal component of plankton (see phytoplankton)

var., vars: variety, varieties.

**Xerophile -philous:** living in dry conditions (ξηρός, φίλος).

## APPENDICES

### APPENDIX I: CLASSIFICATION BY MOLECULAR ANALYSIS - NOTES FOR NON-SPECIALISTS

This short note I wrote a few years ago for our local Naturalists' Club is an attempt to bring some basic understanding of modern cladistics and phylogenetics as a means of classification to the amateur naturalist. It is a selective and short explanation only and I am keenly aware of the dangers of simplifying complex scientific topics, so please forgive the omissions. Please also remember this is an area of very active research and forgive me where new discoveries have overtaken me.

The ability to analyse the genomes of organisms, the gene sequences of their DNA or RNA, has led to much greater comprehension of how species have evolved and the pathways they have taken in response to environmental and other factors over millions of years. The results are also producing many taxonomic changes, and some surprises with regard to how one species is related to others and the pattern of their evolution in terms of chains of innovations over time. The classification of organisms in a hierarchy that reflects their genetic evolutionary ancestry by DNA data analysis is effected through cladistics (clade is from the Greek κλάδος meaning the shoot or branch of a tree). A clade must be monophyletic, *i.e.* a group of organisms whose members share homologous features derived from a single common ancestor. It is worth keeping in mind that the dynamics of evolutionary change for an organism are in its genes and it is the genes that change and evolve as time passes. The result of the analysis is conventionally displayed as a cladogram, a branching diagram that illustrates the way an evolutionary lineage diverges from its ancestral origins. In detailed cladograms, there are many conventions regarding numbering of speciation events at branching nodes, the use of lower case letters for extinct species, *etc.* Cladograms are often simplified to aid interpretation as in the examples below (Figs 1 and 2). Phylograms, phylogenetic trees and phyletic trees are similar. There are Trees of Life cladograms to be viewed on-line and many web sites offer help with this subject generally for those who want to gain a deeper understanding. There are also several computer programs for generating cladograms.

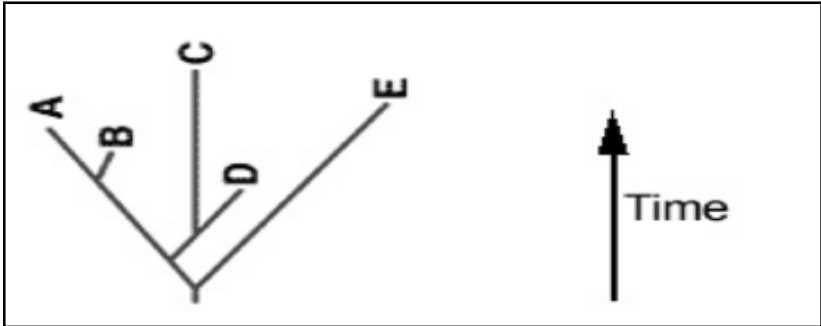
## *In Horto Feritas*

The molecular detective work required to unravel an organism's genetics (sequencing its genome) and then to place it in an evolutionary hierarchy correctly related to all other organisms is, as you would imagine, technically complex. However, one way to begin to understand why it is such a useful scientific tool is to compare it with the traditional Linnaean taxonomy with which all Club members will be more or less familiar.

Traditional taxonomy allocates taxa (taxonomic groups) at various levels (**Phylum**, **Class**, **Order**, **Family**, **Genus**, **species**). This is, obviously, a wholly artificial system imposed by scientists in an effort to classify and arrange life-forms as an aid to understanding. Though undeniably a powerful and, in many respects, highly successful tool, it is rather inflexible and we frequently have to add more levels (*e.g.* *Sub-Class*, *Sub-Order*) when new organisms are discovered that do not fit into the system, producing multi-level trees. Cladistics, on the other hand, regards all levels of the hierarchy as equivalent and is much more flexible, easily accommodating new discoveries. Traditional taxonomy examines the detailed morphology of organisms and then classifies them according to morphological similarities, but modern cladistics unravels gene sequences and is really only concerned with how and when the organism evolved.

Cladistics also does away with the subjective aspects of Linnaean taxonomy. The data are testable and there are no subjective decisions required by the researcher as to where an organism fits into the system - we are all only too familiar with the nomenclatural differences with which we have to cope as taxonomists introduce changed names, but the latest ones based on genetic data should now endure. Revealing an organism's genome gives an absolute and objective analysis of its evolutionary status. Once complete (and because of the complexity of DNA, its sampling in organisms and the use of statistics which involves probability rather than absolute certainty, this is not as simple as it sounds), the cladistic result is fixed; it will not be "lumped" or "split", although it can readily be simplified to aid the illustration of particular relationships.

## *In Horto Feritas*



**Figure 1:** A scaled cladogram or phylogenetic tree for five taxa (A-E). The taxa arise from a common ancestor (root), taxon E having diverged from the others relatively early. The long lines of taxa C and E tell us that they have undergone many changes over time, whereas taxon B has changed little since it diverged from A.

This is not to say that cladistics is a perfect system. Traditional taxonomy can be said to be more “user friendly” and convenient for everyday employment because it enables a species to be given a unique name; cladistics does not recognise the species in this way. Taxa can be logically grouped without recourse to how they evolved or what their ancestors were, and their taxonomically defining features can be easily seen by examination without recourse to a sophisticated laboratory.

Unlike traditional taxonomy, cladistics is not suitable for organisms that swap genes such as some bacteria. Moreover, if we are to consider viruses, which many regard as genes that have “escaped”, we need to be aware of the fragments of genes that have crossed into widely disparate organisms through viral infection.

So what has cladistics told us so far? There are many examples of results of genomic analysis and cladistic classification that are surprising. Many species are not members of the groups we thought they were, or may look very similar but have actually evolved quite differently. Recently, for instance, it has been shown that the recognition of reptiles (**REPTILIA**) is inconsistent with evolutionary history. That is not to say that the taxon will be abandoned by herpetologists as a convenient group name, but it seems that the traditional nomenclatural composition of reptiles (turtles, crocodylians, lizards, snakes, *etc.*) is a false one. Birds are actually the closest modern relative to the crocodylians, and a more correct

## *In Horto Feritas*

grouping in terms of evolutionary relationship is as in Figure 2 below (simplified for clarity):

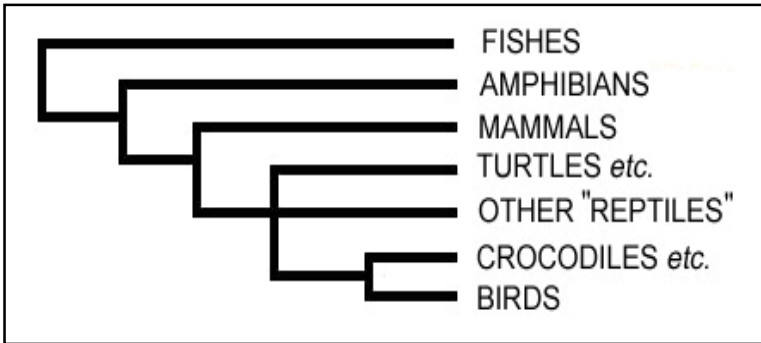


Figure 2: Simple unscaled cladogram showing the evolutionary relationship between various taxa. Birds have been found to be related closely to crocodiles which are not “reptiles” as we commonly consider them.

In plants, many genera are not evolutionally related in the way we once thought. For example, maples, which many of us think of as belonging to the **Aceraceae**, and the horse chestnut (**Hippocastanaceae**) have now been placed with the soapberries (**Sapindaceae**), a mostly tropical family. The **Chenopodiaceae** are in **Amaranthaceae**, **Asclepiadaceae** in **Apocynaceae**, **Lemnaceae** in **Araceae**, **Punicaceae** in **Lythraceae**, **Philadelphaceae** in **Hydrangeaceae**. *Sparganium* is no longer in **Typhaceae** and has its own family (**Sparganiaceae**), and *Sambucus* and *Viburnum* have left the **Caprifoliaceae** and are now placed in the **Adoxaceae**.

In conclusion, both Linnaean taxonomy and genetically based cladistics have much to offer us, the former a convenient and logical method based on readily observable features to group organisms at relatively obvious levels, the latter a sure fire way of telling us exactly what the evolutionary relationships and origins of an organism are. One thing is certain, as we explore the gene sequences of life on earth, there will be many more name changes to keep naturalists and the curators of museums and libraries on their toes.

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## *In Horto Feritas*

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## *In Horto Feritas*

### APPENDIX II: TIPS ON EQUIPMENT, CURATING AND CARING FOR COLLECTIONS.

Wildlife gardeners are by definition naturalists and, even at a very basic level, have the joy of entering the exciting and extraordinarily rewarding and absorbing world of investigative and observational science. Here, then, as an *aide-mémoire* are some simple thoughts and tips on what you may find useful, or sometimes indispensable, along the many pathways that wildlife gardening may take you. The list is not exhaustive and you are bound to gather your own kit as you pursue particular interests.

#### Equipment

Please ensure a first aid kit is to hand and properly stocked.

Out in the garden, you may need some of the following:

- ✓ Bat detector;
- ✓ Beating tray and suitable stick;
- ✓ Binoculars, night vision scope;
- ✓ Endoscope for looking under stones, *etc.* (sometimes called a boroscope);
- ✓ Fine brush;
- ✓ GPS if mapping locations in your garden;
- ✓ Hand lens x10;
- ✓ Hand tools (trowel, spade, *etc.*);
- ✓ High resolution digital camera with macro lens;
- ✓ Mobile phone with camera & note-taking app, or clipboard;
- ✓ Nets (for pond, flying insects, sweeping vegetation);
- ✓ Pencils, labels, sketch pad;
- ✓ Pen-knife;
- ✓ Pocket microscope;
- ✓ Pooter (aspirator), tweezers;
- ✓ Sample/specimen bags & boxes, vasculum, carrier;
- ✓ Secateurs;
- ✓ Shallow white dish for sorting specimens;
- ✓ String/cord;
- ✓ Suitable clothing: *e.g.* strong gloves, boots (steel soles and caps), waterproofs, mask/goggles for some projects, hard

## *In Horto Feritas*

hat if you are building/cutting boughs, ear protectors,  
hat/sunscreen;

- ✓ Tape measure & ruler;
- ✓ Torch;
- ✓ Traps – yellow tray, small mammal, pitfall, light, suction, malaise, spider catcher, bottle, *etc.*

Certain Swiss Army Knife models have some of these as attachments built-in.

Here is an equipment list for indoors in a hobby room or maybe a shed – it is surprising how much working and storage room you need but also how much you can fit into a small space, with careful thought making maximum use of wall space and storage cabinets:

- ✓ Batteries for all portable electrical items – use solar rechargeable if you can;
- ✓ Beechwood creosote (for preventing mould on specimens);
- ✓ Bunsen burner or similar;
- ✓ Computer with internet access – always back up your work;
- ✓ Dissecting kit with tweezers, surgical scissors, scalpel, seeker, fine brush, mounted needle, hand lens;
- ✓ Entomological and small animal cages & supplies;
- ✓ Examination trays/light table;
- ✓ Freeze drier (but very expensive);
- ✓ Identification keys, floras and reference books;
- ✓ Insect specimen killing fluid (or use freezer);
- ✓ Microscopes – monocular and stereo;
- ✓ Microscopy supplies – slides, slide covers, stains, preservatives, *etc.*;
- ✓ Naphthalene (for keeping collections free of mites, *etc.* – toxic, do not inhale);
- ✓ Pencils, pens, sketch pad/notepad;
- ✓ Pins, mounting card, setting boards, *etc.*
- ✓ Plant press;
- ✓ Preserving fluid (isopropyl alcohol, denatured alcohol);
- ✓ Relaxing fluid (for entomological specimens);
- ✓ Resin (for encasing specimens);
- ✓ Storage boxes, display cabinets, glass jars, domes, *etc.*;
- ✓ Test tubes & Petri dishes, laboratory glassware;
- ✓ Tullgren/Berlese funnel (see page 99).

## *In Horto Feritas*

Specialist equipment for amateur naturalists can be obtained from firms such as Watkins & Doncaster.

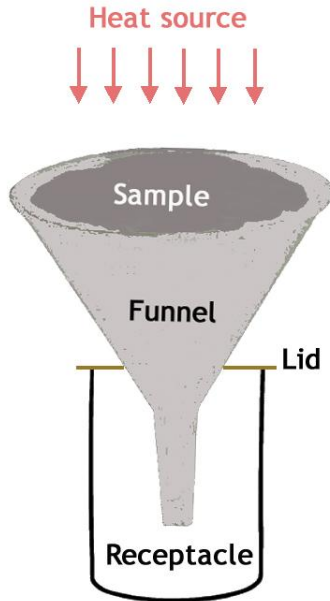
### Preparing and preserving specimens

For detailed information on this topic, you will find institutions such as the Natural History Museum in London very helpful, or other such museums around the country. Several produce papers and short instruction manuals on collecting and preparing specimens. Items you might collect in your garden were mentioned in Chapter 2. In this Appendix I am simply pointing you towards one or two techniques that I hope will start you on your way.

Most specimens you will simply be able to gather as you go around your garden but extracting smaller animals from some items such as soil, leaf litter, compost or nests needs technique. One of the best is to use a Tullgren (also known as Berlese) funnel. This works by creating a humidity gradient through the sample by placing it in a funnel under a heat source such as an electric light bulb (an angle-poise lamp is ideal) but it not one of the low-energy bulbs that emit little heat. An infra-red source would do such as those on sale to ease rheumatic pain or, as Antonio Berlese did, a hot water bath, but I hear a sharp intake of breath from the health and safety brigade at that suggestion.

As the top of the material in the funnel warms up, the animals within it migrate down the funnel and drop into a collecting vessel at its base. This may be a simple box or glass receptacle to which it is best to fit a lid (cut out a piece of card) so you can gather the organisms for study.

## *In Horto Feritas*



***Tullgren or Berlese Funnel***

### Cages and live breeding

Many invertebrates, fish, common amphibians and reptiles and some small mammals can be kept quite happily in captivity and will breed. Considering invertebrates first, the range of organisms you might keep is enormous, from a culture of *Euglena* in a flask to the larger butterflies and hawk-moths. This small book is not intended to give detailed instructions as there is no shortage of information and sound advice from amateur entomological societies, biology departments at colleges and universities, libraries and the internet. Do join your local natural history society, too: most counties have one, or become a member of the British Naturalists' Association.

## *In Horto Feritas*

Please follow a few golden rules. Before you start, understand the biology and ecology of the organism you are keeping or breeding and then mimic their habitat as nearly as you can. Be certain you are providing the correct food, enough of it and that it is in an appropriate state. Keep cages clean and at a fitting temperature and humidity. Ensure you have provided the correct conditions for all life stages. For breeding butterflies and moths, it is often possible to use a net sleeve over their food plant out in the garden rather than a cage to which you have to bring fresh material every day or so.

For other animals, small ones anyway, it is in my view a myth that it is cruel to keep them in cages. The late and great Gerald Durrell knew this and few have had greater experience than he did. Providing enough space, areas to forage, a sufficient and correct diet, fresh water, the right temperature & lighting, and cleanliness/a means to eliminate waste are paramount. Again, it is vital to understand the biology and ecology of the species concerned and, for example, not keep a social species alone. That said, keeping vertebrate animals requires skill, dedication, patience and much time; you should not attempt it unless you have liberal amounts of these resources.

For the wildlife gardener interested in natural history, the most likely vertebrates to be kept for short periods of study will probably be tadpoles, small fish such as three-spined stickleback, slow-worms and perhaps mice or voles. (Note that both the latter are nocturnal.) For these, aquaria, terraria and relatively simple cages are not difficult to set up. Making notes and a photographic record of your live collection, even if you are only keeping some subjects for a few days, is worthwhile, making a useful resource for others, for yourself the next time you keep that species, and for exchanging information with friends, family and colleagues who have similar interests.

You may also have to tend injured or orphaned animals from time to time. In such cases, take advice from a vet first, but caring for and seeing an animal heal so that it can be released into your garden

## *In Horto Feritas*

again is very rewarding. Over the years I have had success with several such casualties including hedgehogs and, after a vet's advice, a tawny owl that had a broken leg – for him, our local butcher became used to strange requests for mouse-sized meat cuts with bits of fur and bone in them! It is a sad fact, though, that many casualties do not survive whatever trauma it was they suffered and, for an obviously badly injured animal, swift despatch is often the best course of action.

### Cataloguing, preparing and storing specimens

Whatever you collect and want to keep will need appropriate recording and storage. Records of your collection can be kept in a note book but are better on computer, suitably backed up. There are many database programs available, some of them open source and therefore free. It is worth spending a little time researching online to find the one that suits you best. As mentioned in Chapter 2, computers allow you to search and cross-reference easily as well as link a particular record to a particular photo or other recording in different databases and index both. Always make a photographic record when the specimen is fresh, as no matter how good the technique, a degree of deterioration will eventually ensue, and you may even lose some material altogether.

The specimens you amass need preservation that is permanent and as trouble-free as possible. Most specimens will be preserved either “dry” or “wet”. Many can be temporarily stored in a deep freeze until you have time to prepare them properly, but beware those that will just turn to mush such as some plant material and certain fungi.

Starting with the tiny, a collection of microscopic slides is well within the means of the amateur and results in an informative and fascinating assemblage that can be stored in a relatively small space. The choice of subjects is almost limitless and will depend on your own interests. For example, you may be keen to examine and record the moulds and diseases that attack your garden plants and

## *In Horto Feritas*

make a collection of those, or the microscopic life in your pond or soil. Spores, moulds and other small specimens can often be mounted on a slide directly, but for many subjects you will need to take a thin section of the sample set in wax, using a razor blade or microtome. To see microscopic structures, you may need to stain the sample, too. Methylene blue, eosin Y, toluidene blue, iodine and neutral red are dyes available to help visualise microscopic structures in cells and other objects. Information on their use is widely available on-line and some are usually supplied with a microscope kit when you acquire one.

For permanent preservation, most specimens will require to have mounting fluid added before you add the cover slip, followed by careful sealing of the edges of the slip once in place (use a fine paint brush) with the same fluid if necessary. Mounting fluids are available from microscopy suppliers but many amateurs use clear nail varnish with good results. It is very important that the specimens are perfectly dry first (usually achieved by washing in 96% ethanol although this can be a little irksome to obtain in this nanny state era). Also ensure no air bubbles are trapped by first putting a drop of the mounting fluid on the specimen, then a second drop on the slide cover such that it is suspended from it as you lower it onto the specimen. Practice and experimentation will make you adept at the procedure.

Slide collections can be stored in any cool, dark, dry place in boxes, or you might invest in one of the attractive bespoke



Storage box of permanent microscope slides from the author's collection.

wooden slide storage boxes of the kind illustrated here, available from specialist suppliers or that come up for sale at auctions now and then.

## *In Horto Feritas*

Above the microscopic scale, many collected specimens such as rocks, fossils, shells, seeds and wood can simply be cleaned and stored. Others, though, such as leaves, flowers and insects will need treatment before permanent storage.



Moths set and displayed (the large black and yellow one to the top right is a death's-head hawk-moth, a migrant that can be common in the UK in some unusual years.

A few subjects will not dry well (see below), but a large number will. Again, there are many techniques and the best one for your subject will need to be selected. For most plants, pressing gives good results although colour is often lost. For animals, consider how you want to display and store them, then choose a method such as pinning and setting for beetles, bugs, flies, bees, wasps, ants, butterflies and moths, etc. This involves setting the specimen on a

cork board, with a groove to take the body for larger insects whose wings are to be displayed. This is done with fresh specimens or ones that have been treated in a relaxing box (a sealed box with a sponge base containing water) using strips of shiny transparent paper, pinned to hold the wings in place without damaging them, and allowed to dry. All equipment for this is available from suppliers such as Watkins and Doncaster or Worldwide Butterflies. Once set, the specimens (with full data – see labelling below – can be kept in sealed storage boxes or a display cabinet made for the purpose. It all takes practice, but the effort is well worthwhile.

Small corpses such as small dead birds and bats can be satisfactorily dried in an airy shed away from any sarcophagous or saprophagous flies. An old-fashioned meat safe is ideal, wrapping each specimen carefully in absorbent paper. Please be aware that you will need a licence from one of the nature conservation agencies – they are generally helpful – to keep any dead bat and certain birds or parts

## *In Horto Feritas*

of them, even if your cat brought it in. This is more idiotic bureaucracy from our nanny state, I'm afraid, but common sense and modern regulations are so often mutually exclusive bedfellows.

Soft-bodied material such as some fungi, most larvae, some groups such as slugs and arachnids, and whole small fish, herpetofauna and mammals are best preserved in fluid. Ethanol has been used traditionally, but for amateurs has been replaced by isopropyl alcohol which is readily obtainable without the ridiculous bureaucracy and having to persuade your chemist that you are not an alcoholic or going to sell hooch. Any clear, wide-topped, glass container of suitable size for the specimens will serve as long as it is clean and has a really tight-fitting lid. Bear in mind that even apparently gas-tight seals will probably lose some preservative through evaporation over time. Inspect regularly and top up if needed.

In Victorian times, taxidermy (literally arranging the skin, τάξις, δέμμα) was a substantial industry and an effective means of preserving all manner of birds and beasts. It still has its followers today and museums such as that at Tring have impressive collections, but it requires great skill and specialist equipment, not to mention the problem of several toxic preservatives involved.

Two other relatively recent innovations merit mention: resin encasement and freeze-drying. Most specimens can be encased in resin after which they are perfectly preserved, but of course they cannot be physically accessed for inspection of parts that may be hidden. The process involves mixing the resin, obtainable from hobby shops or on-line, with a liquid hardener, then encasing the specimen within a mould, a cube is usually best for later viewing. Preparation of the specimen is crucial and it must be completely dry before encasement, usually by soaking in ethanol for a day or two – you will probably have to compromise with a denatured form for the tedious reasons complained of above. Results can be spectacular but do take up a fair amount of space, and there are only so many paperweights one can have.

## *In Horto Feritas*

Freeze-drying or lyophilisation uses the sublimation of water molecules as ice from a specimen converting them directly to vapour which is removed. It is used in the food industry but is also excellent for preserving certain specimens such as corpses of small amphibians, reptiles, fish, birds and mammals but it is very expensive. Specimens are first carefully arranged as they are to be displayed, in a natural pose, say, and then frozen in the apparatus for sublimation. At the time of writing, units for freeze-drying biological specimens of this kind cost £3,000 or so, but you may be able to send your specimens to a laboratory with such a unit for a more reasonable outlay. Once dried, the specimens require care to protect them from mites, mould and other insults.

### Labelling

Having recently finished a re-organisation of my own less-than-perfect records and specimens, I cannot over-emphasise the need to be meticulous about recording relevant detail. Museums and record centres beg us, and they are entirely correct to do so, to ensure that we register fully our observations - the name of the site/locality, our own full name, a six digit grid reference plus its two-letter OS area code, the date the item was recorded, an indication of the local abundance if possible/appropriate, a brief description of habitat and substratum, a photograph or voucher specimen and sound records of such taxa as bats, birds, grasshoppers & crickets and others with distinctive calls. With the exception of digital photographs and sound recordings for which they lacked the superb equipment we have nowadays, those arch observers, the Victorians, were very good at this. I think we are often less particular today, which is a pity, so please label all specimens with:

- your name
- the exact location you collected it
- the date found and the date entered into your collection
- any relevant notes such as the habitat and abundance
- where any related photographs or recordings are
- the collection reference number if you use one.

## *In Horto Feritas*

### Protecting your specimens

Your collection is valuable and represents many hours of work, so it is worth protecting it from the assaults of sunlight, moisture, mould, mites, certain beetles and other impacts. Storing specimens where they will be in direct sunlight is a certain recipe for losing their colour – keep them in a drawer or cupboard or, if on display, well away from direct sunlight. For specimens that are not in sealed jars or encased in resin, avoid damp at all costs as it promotes mould. Although there are treatments available for mould from entomological suppliers such as beechwood creosote or you can use a solution of 10% formalin (but it is toxic), it is better not to have the problem in the first place. To deter pests such as clothes moth, museum beetle or carpet beetle, try cedar oil, regularly replenished, or a commercially available deterrent of the moth ball type. Freezing specimens that have been attacked will kill the invader. Above all, inspect collections regularly, isolate and treat or destroy specimens that have been attacked and do not let a problem spread.

## *In Horto Feritas*

### APPENDIX III: WILDLIFE GARDENING PLANTS – SELECTED LISTS

These are just some of the many plants that benefit biodiversity. Please be aware that successful planting must take account of local climate, edaphic and other environmental conditions. Also, whilst I have tried to avoid listing the real thugs of the botanical world, some plants can be invasive in certain situations that particularly favour them. Please note that many plants contain secondary metabolites that are toxic to humans. Unless you are certain of a plant's comestible status, do not consume, or allow others (especially children or your pets) to consume, plant leaves or their stems/fruit/seed/roots, *etc.*

In the first Table that follows:

The ✓ in brackets thus (✓) in the “British Native” column indicates there are also several horticultural varieties similar enough to be just as good for wildlife. Scientific and vernacular names generally follow Stace, C. (2010 3rd Edn.). *New Flora of the British Isles*. Cambridge University Press, Cambridge, UK.

Trees and shrubs commonly used as hedges are indicated as such but most others can be used for this purpose - note that some (*e.g.* hawthorn) bloom on the previous year's growth so will not produce blossom/fruit if that growth is trimmed before flowering.

Heights for shrubs: “Small” is up to about 1m, “Medium” is about 1m to 2m, “Large” is over 2m. For the herbs, *etc.* “Low” is generally less than about 15cm, “Short” is about 15-40cm, “Medium” is about 40-70cm, “Tall” is above that - there is much intra-taxon variation dependent upon local conditions.

Indirect food chain and predator-prey relationships should be noted - *e.g.* nectar plants attract flying invertebrates which attract bats. This is not in any way an exhaustive list but just suggestions of some of the native British wild plants that can be used in wildlife planting schemes.

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<b>TREES</b>							
<i>Alnus glutinosa</i>	Alder	✓	Large	Good for invertebrates	Waterlogged		
<i>Amelanchier lamarkii</i>	Juneberry		Small	Nectar and fruit	Sandy		North American native naturalised in Britain on occasion
<i>Betula pendula</i>	Silver birch	(✓)	Medium	Invertebrates	Light /acid		Not long lived but good nurse tree
<i>Betula pubescens</i>	Downy birch	✓	Small	Invertebrates	Grows on poorly drained soils, cold resistant		
<i>Crataegus monogyna</i>	Hawthorn	(✓)	Small (hedge)	Masses of flowers and berries, good protection for bird nests – food plant of many (<200) invertebrates.	Euryoecious		Flowers on previous year's growth so if hedge, leave some untrimmed. <b>NB</b> Double-flowered varieties may be sterile.
<i>Crataegus laevigata</i>	Midland hawthorn	✓	Small (hedge)	Masses of flowers and berries, good protection for bird nests – food plant of many invertebrates.	Euryoecious		Flowers on previous year's growth so if hedge, leave some untrimmed
<i>Fagus sylvatica</i>	Beech	(✓)	Large	Good for invertebrates; beech mast	Calcicole but tolerant		
<i>Ilex aquifolium</i>	Holly	(✓)	Medium (hedge)	Good for invertebrates; late berries for birds and good protection for nests, roosts.	Euryoecious		Dioecious - needs one or two ♂ trees for ♀ trees to berry – plant both.
<i>Malus sylvestris</i>	Crab apple	(✓)	Small/ medium	Flowers and fruit – good for invertebrates, birds. Supports mistletoe.	Euryoecious but best on fertile soils		Avoid spraying domestic vars with pesticides. Many varieties.
<i>Populus tremula</i>	Aspen	✓	Medium/ large	Good for invertebrates			

<sup>14</sup> Many plants have multiple benefits to many different species. Only a few of the groups to which a plant may be of particular importance are listed here, or the feature of the plant of special value.

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Prunus avium</i>	Wild cherry	✓	Medium/ large	Good for invertebrates and birds	Fertile soil - euryoecious		
<i>Prunus cerasifera</i>	Cherry plum		Medium	Good for birds			Birds consume the buds as well as fruit
<i>Prunus padus</i>	Bird cherry	✓	Small	Blackbirds love the fruit	Euryoecious	✓	
<i>Quercus petraea</i>	Sessile oak	✓	Large	Huge number of invertebrates, & birds & mammals associated with this species			
<i>Quercus robur</i>	Pedunculate oak	✓	Large	Huge number of invertebrates, & birds & mammals associated with this species	Euryoecious		Jays eat the acorns
<i>Salix alba, fragilis, etc.</i>	Larger willows	(✓)	Medium-large	Good for invertebrates	Moist/wet		Pollards well
<i>Sorbus aria</i>	Common whitebeam	(✓)	Medium	Nectar & fruit for birds			Many varieties with plenty of fruit
<i>Sorbus aucuparia</i>	Rowan	(✓)	Medium	Nectar and fruit for birds			
<i>Taxus baccata</i>	Yew	✓	Medium	Winter shelter, fruit	Euryoecious		Toxic to some species including man
<i>Tilia cordata</i>	Small-leaved lime	✓	Large	Good for invertebrates			Aphid infestations common
<b>SHRUBS (see also small and hedge trees above)</b>							
<i>Berberis spp</i>	Barberries		Various	Nectar, fruit, cover for birds			
<i>Buddleia davidii</i>	Butterfly bush		Large	Late nectar, good for invertebrates	Xeric/ saxicolous	✓	Can be invasive. Prune hard in early spring for late blooms. Avoid the species and large horticultural varieties – use 'Miss Ruby' or the dwarf 'Low and Behold Blue Chip'.
<i>Buddleia globosa</i>	Orange ball buddleia		Large	Nectar, good for invertebrates			
<i>Calluna vulgaris</i>	Heather	(✓)	Small	>100 moths associated with this sp.	Acidophile		

# In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Caryopteris x clandonensis</i>	Bluebeard		Small	Late nectar, good for bees & butterflies, etc.			
<i>Cornus</i> spp	Dogwood	(✓)	Medium / large	Fruit			Very early flowers on some spp.
<i>Corylus avellana</i>	Hazel	✓	Large	Nuts (dormice), food plant of many invertebrates			Cultivars too.
<i>Cotoneaster</i> spp	Cotoneaster	?	Various	Nectar, good for invertebrates, fruit for birds and cover	Often calcareous		One sp. may be native (Gt. Ormes Head) but this is a large & varied genus increasingly naturalised in UK. Some are invasive.
<i>Cytisus</i> spp	Broom	(✓)	Medium	Nectar, good for invertebrates	Acidophile		
<i>Erica</i> spp	Heathers etc.	(✓)	Small	Nectar, invertebrate food plant	Acidophiles		Many floriferous varieties.
<i>Escallonia</i> spp	Escallonia		Medium	Nectar and nest sites for birds			
<i>Euonymus europaeus</i>	Spindle	✓	Large	Fruit	Calcicole		Berries are toxic to humans.
<i>Forsythia</i> spp	Forsythia		Medium/ Large	Early nectar for invertebrates			
<i>Frangula alnus</i>	Alder buckthorn	✓	Medium	Food plant of brimstone butterfly			
<i>Griselinia littoralis</i>	Kapuka		Medium	Shelter	Halophyte		Useful to provide shelter from wind in coastal sites
<i>Hebe</i> - see <i>Veronica</i>							
<i>Juniperus communis</i>	Juniper	✓	Medium	Cover, good for invertebrates			
<i>Laurus nobilis</i>	Sweet bay		Large	Nectar, Fruits, winter shelter and nest/roosting sites	Calcicole	✓	Aromatic. Cut back by severe frosts
<i>Lavandula</i> varieties	Lavender		Small/ medium	Nectar, seeds – extraordinarily attractive to many insects and other invertebrates		✓	Aromatic
<i>Leycesteria formosa</i>	Pheasant berry		Medium/ large	Fruits			Umbricolous

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Ligustrum vulgare</i>	Wild privet	✓	Medium/ large	Nectar, fruit, winter shelter, nest/roost sites			Avoid pruning to obtain flowers & fruit.
<i>Mahonia</i> spp	Oregon-grapes		Small/ medium	Late winter nectar, fruit		✓	Spp such as <i>M. japonica</i> are umbri-colous.
<i>Prunus spinosa</i>	Blackthorn	✓	Large	Nectar, fruit – spines give protective cover for nests and roosting	Euryoecious		
<i>Pyracantha</i> spp	Firethorn		Medium	Fruit, nectar, cover for nests/roosts			
<i>Rhamnus catharticus</i>	Buckthorn	✓	Medium	Food plant of brimstone butterfly			
<i>Rosa</i> spp	Roses	(✓)	Medium	Nectar, fruit, cover	Various	(✓)	Many domestic roses are valuable for nectar and fruit. <i>R. rubiginosa</i> (sweet briar) is a good native to plant on limy soils.
<i>Rosmarinus officinalis</i>	Rosemary		Small	Nectar	Calcicole		Aromatic - occasionally naturalised.
<i>Salix caprea</i>	Goat willow	✓	Large	Pollen, good for invertebrates			
<i>Sambucus nigra</i>	Elder	(✓)	Medium/ large	Nectar, fruit	Euryoecious		Makes good wine, too!
<i>Ulex</i> spp	Gorses	(✓)	Medium	Early nectar, good cover on heathland, etc.	Xeric, low pH	✓	
<i>Veronica</i> (sect. <i>Pseudo-veronica</i> )	Hebes		Medium to Large	Nectar, especially early and late for invertebrates			Large group - some with winter flowers but may be tender in UK.
<i>Viburnum lantana</i>	Wayfaring tree	✓	Large	Nectar, fruit	Calcicole		Keep unpruned
<i>Viburnum opulus</i>	Guelder rose	(✓)	Large	Nectar, fruit	Calcicole		Keep unpruned
<i>Viburnum tinus</i>	Laurustinus		Large	Winter nectar for invertebrates, berries	Calcicole		Keep unpruned. There are many other <i>Viburnum</i> spp for scent, nectar and berries.

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<b>CLIMBERS AND WALL PLANTS</b>							
<i>Chaenomeles japonica</i>	Japanese quince		Medium	Early nectar and fruit			Not all produce fruit – select carefully.
<i>Clematis montana</i>	Himalayan clematis		Large	Provides good cover for bird nests and roosts			
<i>Garrya elliptica</i>	Coast silk-tassel		Medium	Early pollen, winter cover	Grows on north walls,		Dioecious - pollen on ♂ catkins, small berries on ♀ – umbricolous.
<i>Hedera helix</i>	Ivy	✓	Large	Winter nectar attracting invertebrates and thus insectivorous birds; berries, good cover	Tolerates dry, poor soils		A must for providing winter nectar; food plant of holly blue butterfly and swallow-tailed moth.
<i>Hedera cultivars</i>	Ivy varieties		Medium	Cover especially in winter for birds and invertebrates	Euryoecious		May not be fertile.
<i>Humulus lupulus</i>	Hop		Medium	Food of comma, red admiral and peacock butterflies			Naturalised almost everywhere in UK.
<i>Jasminum nudiflorum</i>	Winter jasmine		Medium	Early nectar			Umbricolous, widely naturalised in south.
<i>Jasminum officinale</i>	Summer jasmine		Medium	Nectar		✓	Naturalised in south and central UK
<i>Lonicera periclymenum</i>	Honeysuckle	(✓)	Medium to tall	Nectar, berries, cover and nesting sites		✓	Bark famously favoured by dormice for nests but several birds use it too.
<i>Parthenocissus quinquefolia</i>	Virginia-creeper		Large/ very tall	Cover for nests , etc.	Euryoecious		Also <i>P. tricuspidata</i> (Boston-ivy).
<i>Pyracantha</i> varieties	Firethorn		Small/ medium	Nectar, berries, cover	Euryoecious		
<i>Rosa canina</i> agg and <i>Rosa</i> spp & varieties	Dog rose and other climbing roses	(✓)	Various	Nectar, hips	Fertile	(✓)	

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Rubus fruticosus</i> agg.	Blackberry	✓	Medium	Nectar, important late fruit resource, excellent cover	Euryoecious		Invasive but there are cultivars available for gardens which are less aggressive.
<i>Vitis</i> spp.	Vines		Large/ very tall	Fruit, cover	Poor		
PERENNIALS/ANNUALS/BULBS/CORMS							
<i>Achillea</i>	Milfoil	(✓)	Medium	Invertebrates (nectar)			Many coloured varieties.
<i>Agrostemma githago</i>	Corncockle	✓	Tall	Nectar			Very rare as native now – grows readily from seed.
<i>Ajuga reptans</i>	Bugle	(✓)	Low	Early nectar for invertebrates	Moist		Tolerates some shade
<i>Alliaria petiolata</i>	Hedge mustard	✓	Medium	Food for several pierid butterflies	Umbricolous		A plant for the hedgerow or a shady wild corner.
<i>Allium schoenoprasum</i>	Chives	(✓)	Medium-low clump	Nectar	Calcicole		Rare native but common in cultivation. Other onions too.
<i>Alyssum alyssoides</i>	Small alison		Low	Nectar	Saxicole		Naturalised – formerly widespread.
<i>Amaranthus caudatus</i>	Love-lies-bleeding		Tall	Seeds good for birds	Poor soils		
<i>Anemone nemorosa</i>	Wood anemone	✓	Low	Early nectar	Woodland		
<i>Armeria maritima</i>	Thrift	✓	Short	Late nectar - provides cover in arid places	Saxicole		
<i>Aster novi-belgii</i>	Michaelmas daisy		Medium/ tall	Late nectar			
<i>Aubrieta deltoidea</i>	Aubrieta		Low	Early nectar	Saxicole		
<i>Bellis perennis</i>	Daisy	✓	Low	Early nectar			
<i>Borago officinalis</i>	Borage		Medium	Nectar	Dry		Spreads.
<i>Calendula officinalis</i>	Marigold		Medium	Loved by hoverflies			Easy from seed.
<i>Calluna vulgaris</i>	Heather	(✓)	Short	Nectar	Calcifuge		

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Caltha palustris</i>	Marsh marigold	✓	Medium	Nectar and shelter at pond edge – good for <i>Hymenoptera</i> .	Wet		Frogs shelter in foliage. Double-flowered horticultural varieties may be less good for invertebrates.
<i>Campanula</i> spp	Bellflowers	(✓)	Medium	Nectar			
<i>Cardamine pratensis</i>	Cuckoo Flower	✓	Short	Early nectar, food plant of orange-tip butterfly	Moist		
<i>Centaurea cyanus</i>	Cornflower		Medium	Seeds			Naturalised – scarce.
<i>Centaurea nigra</i>	Common knapweed	✓	Medium	Late nectar			
<i>Centaurea scabiosa</i>	Greater knapweed	✓	Tall	Associated with many moths, bugs, beetles, flies and cynipid wasps	Calcicole		
<i>Centranthus ruber</i>	Red valerian		Medium	Late nectar	Saxicole		
<i>Chamerion angustifolium</i>	Rosebay willowherb	✓	Tall	Host plant for the elephant hawk-moth			Can be invasive – best in a wild corner where it can be controlled.
<i>Chrysanthemum segetum</i> see <i>Glebionis</i>							
<i>Cichorium intybus</i>	Chicory	✓	Tall	Nectar	Calcicole		
<i>Crocus</i> spp	Spring crocus		Small	Early nectar			Some naturalised.
<i>Digitalis purpurea</i>	Foxglove	✓	Large	Nectar - good for invertebrates	Calcifuge		Self seeds readily. Grow from wild collected seed.
<i>Dipsacus fullonum</i>	Teasel	✓	Tall	Nectar, seeds for birds			
<i>Echinacea purpurea</i>	Coneflower		Medium	Nectar, seeds for birds			
<i>Echinops ritro</i>	Globe thistle		Large	Nectar, seeds for birds			
<i>Eranthis hyemalis</i>	Winter aconite		Short	Early nectar			Can be hard to establish. Also <i>E. cilicicus</i> .

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Erica cinerea</i>	Bell heather	(✓)	Medium	Nectar	Calcifuge		
<i>Erigeron speciosus</i>	Fleabane		Medium	Nectar, Insects			This is the garden form – there are native fleabanes.
<i>Eryngium</i> spp	Sea hollies	(✓)	Medium	Nectar, Seeds			
<i>Erysimum cheir-anthoides/ E. cheiri</i>	Wallflowers		Short	Early nectar		✓	Will set seed and spread.
<i>Eupatorium cannabinum</i>	Hemp agrimony	✓	Tall	Late nectar, good for invertebrates			
<i>Filipendula ulmaria</i>	Meadowsweet	✓	Tall	Nectar, good for invertebrates	Moist/wet		Aromatic - smells of germolene.
<i>Foeniculum vulgare</i>	Fennel		Tall	Nectar, seeds, good for hoverflies			Aromatic.
<i>Fragaria vesca</i>	Wild strawberry	✓	Short	Larval food plant of grizzled skipper	Umbricolous		Good ground cover in light shade – tasty fruit too!
<i>Galanthus nivalis</i>	Snowdrop	✓	Short	Early nectar			Mostly naturalised.
<i>Galium</i> spp	Bedstraws	✓	Short/ medium	Food plant of many moths		(✓)	<i>G. aparine</i> is invasive and best avoided.
<i>Geranium</i> spp	Crane's-bills	(✓)	Short / Medium	Nectar			Many different varieties.
<i>Glebionis segetum</i>	Corn marigold		Medium	Good for invertebrates			
<i>Helianthus annuus</i>	Sunflower		Tall	Seeds especially for birds			
<i>Helichrysum</i> spp	Everlastings		Medium	Nectar			
<i>Helleborus foetidus</i>	Stinking hellebore	✓	Medium	Early nectar, good for bees and wasps	Calcicole		
<i>Hesperis matronalis</i>	Sweet rocket		Tall	Early nectar, good for <i>Lepidoptera</i>	Mesic, (umbricolous)	✓	Naturalised.
<i>Hyssopus officinalis</i>	Hyssop		Medium	Nectar	Warm (heliophilous)		Naturalised in places, aromatic.
<i>Iberis umbellata</i>	Candytuft		Short	Nectar			
<i>Knautia arvensis</i>	Field scabious	✓	Medium	Nectar - good for invertebrates and associated with several <i>Lepidoptera</i>			
<i>Lamium</i> spp	Dead-nettles	(✓)	Short/ medium	Early nectar			

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Lathyrus</i> – see <i>Vicia</i>							
<i>Leuc-anthemum vulgare</i>	Ox-eye Daisy	✓	Medium	Nectar, good for hoverflies			
<i>Ligularia</i> spp	Leopardplants		Tall	Nectar, good for invertebrates	Moist		
<i>Linaria annua</i>	Honesty	✓	Medium	Early nectar, seeds			Self seeds readily
<i>Lobelia</i> spp	Lobelias		Short	Early nectar			<i>L. cardinalis</i> is taller and a waterside plant.
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil	✓	Short	Dingy skipper & common blue butterflies host			
<i>Lychnis flos-cuculi</i>	Ragged-robin	✓	Medium	Nectar, good for bumblebees	Moist/wet		
<i>Lythrum salicaria</i>	Purple-loosestrife	✓	Tall	Nectar, good for bumblebees and several <i>Lepidoptera</i>	Moist/wet		Can be rather invasive.
<i>Malva moschata</i>	Musk mallow	✓	Medium	Nectar, a food plant of painted lady butterfly			
<i>Matthiola longipetala</i>	Night-scented stock		Short	Good for invertebrates		✓	
<i>Mentha aquatica</i> and other mints	Water mint, etc.	(✓)	Short-medium	Nectar, good for butterflies, etc.	Various		Aromatic.
<i>Monarda didyma</i>	Sweet bergamot		Medium / tall	Nectar		✓	
<i>Muscari</i> spp	Grape hyacinth, etc.		Short	Early nectar			
<i>Myosotis</i> spp	Forget-me-nots	(✓)	Short-medium	Early nectar and seeds			Self seeds.
<i>Nepeta cataria</i>	Catmint	(✓)	Short-medium	Nectar, good for bees and wasps			Interesting secondary metabolites - aromatic.
<i>Nicotiana</i> spp	Tobacco plants		Medium / tall	Scent, good for moths		✓	Some scented at night.
<i>Oenothera</i> spp	Evening primroses	(✓)	Tall	Nectar and seeds		✓	
<i>Origanum vulgare</i>	Marjoram		Short / medium	Late nectar	Xeric		Many varieties.
<i>Phlox paniculata</i>	Phlox		Medium / tall	Nectar	Does not stand drought	✓	

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Plantago media</i>	Hoary plantain		Short	Insect-pollinated plantain			Naturalises well in lawns and flowers profusely if left uncut or mown around for a few weeks in late spring.
<i>Primula vulgaris</i>	Primrose	✓	Low	Early nectar			
<i>Prunella vulgaris</i>	Selfheal	✓	Low	Several moths and beetles feed on this			
<i>Reseda lutea</i>	Wild mignonette	✓	Short	Several pierid butterflies and chrysomelid beetles feed on this	Calcirole		
<i>Saponaria officinalis</i>	Soapwort	✓	Medium	Nectar, associated with several hawk-moths			
<i>Scabiosa</i> spp	Scabious	(✓)	Medium	Nectar	Prefer drier ground		
<i>Scilla</i> spp and related	Squills, etc.	(✓)	Short	Early nectar	Several are woodlanders	✓	Also native bluebell but avoid Spanish bluebell which hybridises with our native sp.
<i>Sedum spectabile</i>	Ice plant		Medium	Early nectar, good for butterflies, etc.			
<i>Silene</i> spp	Campions	✓	Medium	Nectar		(✓)	Some scented.
<i>Solidago virgaurea</i>	Goldenrod	✓	Tall	Late nectar, good for invertebrates			Also the naturalised <i>S. canadensis</i> but can be invasive.
<i>Stachys sylvaticum</i>	Hedge woundwort	✓	Medium	Good for invertebrates, nectar			Shade tolerant.
<i>Symphytum</i> spp	Comfrets	(✓)	Medium	Nectar	Moist		
<i>Tagetes patula</i>	French marigold		Short	Nectar, attracts hoverflies			Aromatic.
<i>Taraxacum</i> and <i>Asteraceae</i> generally	Dandelions, cat's-ears, hawkbits, etc.		Medium / short	Good for invertebrates, early nectar			
<i>Thymus</i> spp	Thymes	(✓)	Low	Late nectar, good for invertebrates	Xeric		
<i>Trifolium</i> spp	Clovers	✓	Short	Early nectar, good for bees			

# In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Tropaeolum majus</i>	Nasturtium		Medium	Nectar, good for invertebrates	Euryoecious		Frost sensitive but easy from seed.
<i>Urtica dioica</i>	Common nettle	✓	Medium/ tall	Host for nymphalid butterflies			Worth having a patch in a hidden corner
<i>Verbena bonariensis</i>	Argentinean vervain		Tall	Nectar		✓	
<i>Vicia &amp; Lathyrus spp</i>	Vetches etc.	✓	Medium / (tall)	Hosts for lycaenid butterflies			Often scrambling
<i>Viola spp</i>	Violet, pansy, viola	(✓)	Small	Early nectar		✓	<i>V. odorata</i> is very sweet scented.
<b>PLANTS FOR PONDS</b>							
<i>Alisma plantago-aquatica</i>	Water plantain	✓	Medium marginal	Associated with spp of <i>Odonata</i> , <i>Diptera</i> and weevils			
<i>Butomum umbellatus</i>	Flowering-rush	✓	Tall marginal	Associated with green leaf-hopper <i>Cicadella viridis</i>			Not easy to establish.
<i>Caltha palustris</i>	Marsh marigold			See above			
<i>Cardamine pratensis</i>	Cuckooflower			See above			
<i>Ceratophyllum demersum</i>	Rigid hornwort	✓	Submerged	Oxygenator, invertebrates, shelter			Also <i>C. submersum</i>
<i>Filipendula ulmaria</i>	Meadowsweet			See above			
<i>Geum rivale</i>	Water avens	✓	Marshy edge	Nectar, good for solitary bees			
<i>Iris pseudacorus</i>	Yellow iris	✓	Medium-tall marginal	Cover, nectar, associated with various spp of <i>Hymenoptera</i> , <i>Odonata</i> , <i>Coleoptera</i> , <i>Lepidoptera</i>			
<i>Lobelia cardinalis</i>	Cardinal flower		Tall - marshy edge	Nectar			
<i>Lychnis flos-cuculi</i>	Ragged-robin			See above			
<i>Lythrum salicaria</i>	Purple-loosestrife			See above			
<i>Mentha aquatica</i>	Water mint			See above			
<i>Menyanthes trifoliata</i>	Bogbean	✓	Surface spreading	Nectar, good for bees and wasps			
<i>Myosotis scorpioides</i>	Water forget-me-not	✓	Short marginal	Nectar - good for bees			

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Myriophyllum spicatum</i>	Spiked water-milfoil	✓	Submerged	Oxygenator, shelter			
<i>Nymphoides peltata</i>	Fringed water-lily	✓	Floating	Nectar, dragonflies, shelter for small fish and tadpoles			Other water-lilies, too – some are very large.
<i>Ranunculus flammula</i>	Lesser spearwort	✓	Short marginal	Nectar, associated with various damselflies			
<i>Rorippa nasturtium-aquaticum</i>	Water-cress	✓	Short-medium	Food plant of green-veined white butterfly			
<i>Sparganium erectum</i>	Bur-reed	✓	Tall	Seed for birds			Grows in deep water – also other bur-reeds.
<i>Stachys palustris</i>	Marsh woundwort	✓	Medium - marshy edge	Nectar, good for bees and wasps, associated with green tortoise beetle <i>Cassida viridis</i>			
<i>Symphytum</i> spp	Comfrets			See above			
<i>Veronica beccabunga</i>	Brooklime	✓	Short marginal	Nectar, shelter for tadpoles, etc.			Newts lay eggs on leaves.
<b>BRITISH NATIVE GRASSES, SEDGES and RUSHES</b>							
<i>Agrostis</i> spp	bents	(✓)	Medium	Seeds, etc.			
<i>Aira</i> spp	hair-grasses	✓	Low	<i>A. praecox</i> is food plant of grayling butterfly			
<i>Alopecurus</i> spp	foxtails	(✓)	Medium	Seeds, etc.			
<i>Anthoxanthum odoratum</i>	sweet vernal-grass	✓	Medium	Food plant of various flies, micro-moths, bugs.		✓	
<i>Brachypodium pinnatum</i>	tor-grass	✓	Medium	Marbled white and wall butterfly food plant	Calcirole		
<i>Brachypodium sylvaticum</i>	false brome	✓	Medium	Food plant of 12 butterflies, many moths, etc.			Umbricolous.
<i>Briza</i> spp	quaking grasses	✓	Various	Seeds, etc.	<i>B. media</i> is a calcirole		
<i>Bromus</i> spp	bromes	✓	Various	Seeds, etc.			
<i>Calamagrostis epigejos</i>	wood small-reed	✓	Tall	Food plant for various butterflies, moths, sawflies, flies and bugs.	Moist		Umbricolous, good for damp places.
<i>Carex</i> spp	sedges	✓	Various	Many spp are good seed sources			

## In Horto Feritas

SCIENTIFIC NAME	COMMON NAME	BRITISH NATIVE	SIZE/ TYPE	WILDLIFE NOTES <sup>14</sup>	SOIL	SCENT	COMMENT
<i>Cynosurus cristatus</i>	crested dog's-tail	✓	Medium	Food plant of meadow brown and other butterflies			
<i>Danthonia decumbens</i>	heath-grass	✓	Short-medium	Seeds, etc.			Useful small grass.
<i>Deschampsia flexuosa</i>	wavy hair-grass	✓	Medium-tall	Associated with several satyrid butterflies and noctuid moths plus many bugs, etc.	Acidophile		
<i>Festuca</i> spp	fescues	✓	Various	Many associated invertebrates, seeds shelter, etc.			
<i>Glyceria</i> spp	sweet-grasses	✓	Various	Newts wrap eggs in leaves of <i>G. fluitans</i>	Water-logged		Wet places.
<i>Helictotrichon pratense</i>	meadow oat-grass	✓	Medium	Food plant of dusky swallow – a moth of limited UK distribution	Calcicole		
<i>Holcus lanatus</i>	Yorkshire-fog	✓	Medium	Food plant of several butterflies			Ubiquitous and can be invasive.
<i>Juncus</i> spp	rushes	✓	Various	Several spp are good seed source – good cover near water	Moist-wet		Many spp in different shapes and sizes for wetland planting.
<i>Melica uniflora</i>	wood melick	✓	Medium	Seeds, etc.			Umbricolous.
<i>Milium effusum</i>	wood millet	✓	Medium	Associated with satyrid butterflies and several micro-moths			Umbricolous.
<i>Phalaris arundinacea</i>	reed canary-grass	✓	Tall	Many bugs, moths, flies and at least two beetles feed on this	Water-logged		Wet places – needs space.
<i>Phleum</i> spp	cat's-tails	✓	Various	Seeds, etc.			
<i>Poa</i> spp	meadow-grasses	✓	Various	Seeds, etc.			Avoid <i>Poa annua</i> – invasive.
<i>Trisetum flavescens</i>	yellow oat-grass	✓	Medium	Seeds, etc.			
<i>Vulpia bromoides</i>	squirreltail fescue	✓	Medium	Seeds, etc.			

**Remember: insectivores such as bats and herpetofauna are attracted to plants where there will be prey**

**Don't forget that bryophytes (mosses & liverworts), lichens and fungi are very important in communities and ecosystems. They will usually colonise naturally.**

# *In Horto Feritas*

## Suggested List of Native British Species for Semi-Natural Garden Planting

Please always check soil type and suitability. Try to select species that are locally native in your area and obtain locally genetic seed/plants from a specialist supplier.

### TREES AND SHRUBS

<i>Acer campestre</i>	field maple
<i>Alnus glutinosa</i>	alder
<i>Betula pendula</i>	silver birch
<i>Betula pubescens</i>	downy birch
<i>Buxus sempervirens</i>	box
<i>Calluna vulgaris</i>	heather
<i>Carpinus betulus</i>	hornbeam
<i>Cornus sanguinea</i>	dogwood
<i>Corylus avellana</i>	hazel
<i>Crataegus laevigata</i>	Midland hawthorn
<i>Crataegus monogyna</i>	hawthorn
<i>Cytisus scoparius</i>	broom
<i>Daphne laureola</i>	spurge-laurel
<i>Erica cinerea</i>	bell heather
<i>Erica tetralix</i>	cross-leaved heath
<i>Euonymus europaeus</i>	spindle
<i>Fagus sylvatica</i>	beech
<i>Frangula alnus</i>	alder buckthorn
<i>Fraxinus excelsior</i>	ash
<i>Genista anglica</i>	petty whin
<i>Genista pilosa</i>	hairy greenweed
<i>Genista tinctoria</i>	dyer's greenweed
<i>Helianthemum nummularium</i>	common rock-rose
<i>Ilex aquifolium</i>	holly
<i>Juniperus communis</i>	juniper
<i>Ligustrum vulgare</i>	wild privet
<i>Malus sylvestris</i>	crab apple
<i>Myrica gale</i>	bog myrtle
<i>Populus nigra</i>	black poplar
<i>Populus tremula</i>	aspen
<i>Populus x canescens</i>	grey poplar
<i>Prunus avium</i>	wild cherry
<i>Prunus padus</i>	bird cherry
<i>Prunus spinosa</i>	blackthorn
<i>Quercus petraea</i>	sessile oak
<i>Quercus robur</i>	pedunculate oak
<i>Rhamnus catharticus</i>	buckthorn
<i>Ribes nigrum</i>	black currant
<i>Ribes sylvestre</i>	red currant
<i>Ribes uva-crispa</i>	gooseberry
<i>Rosa arvensis</i>	field rose
<i>Rosa canina</i> agg.	dog rose
<i>Rosa pimpinellifolia</i>	burnet rose
<i>Rosa rubiginosa</i>	sweet briar
<i>Rosa villosa</i>	downy rose
<i>Rubus caesius</i>	dewberry

## *In Horto Feritas*

<i>Rubus fruticosus</i> agg.	bramble
<i>Rubus idaeus</i>	raspberry
<i>Ruscus aculeatus</i>	butcher's-broom
<i>Salix alba</i>	white willow
<i>Salix aurita</i>	eared willow
<i>Salix caprea</i>	goat willow
<i>Salix cinerea</i>	grey willow
<i>Salix fragilis</i>	crack willow
<i>Salix pentandra</i>	bay willow
<i>Salix purpurea</i>	purple willow
<i>Salix repens</i>	creeping willow
<i>Salix triandra</i>	almond willow
<i>Salix viminalis</i>	osier
<i>Sambucus nigra</i>	elder
<i>Sorbus aria</i>	whitebeam
<i>Sorbus aucuparia</i>	rowan
<i>Sorbus torminalis</i>	wild service-tree
<i>Taxus baccata</i>	yew
<i>Tilia cordata</i>	small-leaved lime
<i>Tilia platyphyllos</i>	large-leaved lime
<i>Tilia x vulgaris</i>	common lime
<i>Ulex europaeus</i>	common gorse
<i>Ulex minor</i>	dwarf gorse
<i>Ulmus glabra</i>	wych elm
<i>Ulmus minor</i>	small-leaved elm
<i>Ulmus procera</i>	English elm
<i>Vaccinium myrtillus</i>	bilberry
<i>Vaccinium oxycoccus</i>	cranberry
<i>Viburnum lantana</i>	wayfaring tree
<i>Viburnum opulus</i>	guelder-rose

## *In Horto Feritas*

### SOME PERENNIAL AND BIENNIAL INDIGENOUS SPECIES GENERALLY AVAILABLE AS SEED FOR PERMANENT GRASSLAND

SCIENTIFIC NAME	VERNACULAR NAME	SOIL SUITABILITY		
		SANDY	CHALK/ LIMESTONE	CLAY
FORBS				
<i>Achillea millefolium</i>	yarrow	xx	xx	xx
<i>Agrimonia eupatoria</i>	agrimony	xx	xx	xx
<i>Anthyllis vulneraria</i>	kidney vetch	xx	xxx	
<i>Centaurea nigra</i>	common knapweed	xx	x	xx
<i>Centaurea scabiosa</i>	greater knapweed	xx	xxx	x
<i>Cichorium intybus</i>	chicory	xx	x	xx
<i>Daucus carota</i>	wild carrot	xxx	xx	x
<i>Echium vulgare</i>	viper's-bugloss	xx	xx	
<i>Erigeron acer</i>	blue fleabane	x	xxx	
<i>Filipendula vulgaris</i>	dropwort	x	xxx	
<i>Galium mollugo</i>	hedge bedstraw			xx
<i>Galium verum</i>	ladies' bedstraw	xx	xx	xx
<i>Geranium pratense</i>	meadow crane's-bill		xx	x
<i>Hypericum perforatum</i>	perforate St. John's-wort	xx	xx	x
<i>Knautia arvensis</i>	field scabious	x	x	x

## *In Horto Feritas*

SCIENTIFIC NAME	VERNACULAR NAME	SOIL SUITABILITY		
		SANDY	CHALK/ LIMESTONE	CLAY
<i>Leucanthemum vulgare</i>	oxeye daisy	xx	xx	xx
<i>Linaria vulgaris</i>	common toadflax	xx	xx	xx
<i>Lotus corniculatus</i>	common bird's-foot -trefoil`	xx	xx	xx
<i>Malva moschata</i>	musk mallow	xx	xx	xx
<i>Medicago lupulina</i>	black medick	xx	xx	xx
<i>Pastinacia sativa</i>	wild parsnip	xx	xx	xx
<i>Pimpinella saxifraga</i>	burnet saxifrage	xx	xx	xx
<i>Plantago media</i>	hoary plantain		xxx	
<i>Plantago lanceolata</i>	ribwort plantain	xx	xx	xx
<i>Primula veris</i>	cowslip	x	xx	xx
<i>Prunella vulgaris</i>	selfheal	xx	xx	xx
<i>Ranunculus acris</i>	meadow buttercup	xx	xx	xx
<i>Ranunculus bulbosus</i>	bulbous buttercup	x	x	`xx
<i>Reseda lutea</i>	wild mignonette	x	xxx	x
<i>Rhinanthus minor</i>	yellow rattle	xx	xx	xx
<i>Rumex acetosa</i>	sorrel	xx	xx	xx

## In Horto Feritas

SCIENTIFIC NAME	VERNACULAR NAME	SOIL SUITABILITY		
		SANDY	CHALK/ LIMESTONE	CLAY
<i>Salvia verbenaca</i>	wild clary	xx	xx	xx
<i>Sanguisorba minor</i>	salad burnet	x	xxx	x
<i>Silene alba</i>	white campion	xx	xx	xx
<i>Silene dioica</i>	red campion			xx
<i>Silene vulgaris</i>	bladder campion	xx	xx	xx
<i>Stachys officinalis</i>	betony	xx	xx	xx
<i>Tanacetum parthenium</i>	feverfew	xx	xx	xx
<i>Tanacetum vulgare</i>	tansy	xx	xx	xx
<i>Taraxacum officinalis</i> agg.	dandelion	xx	xx	xx
<i>Thymus polytrichus</i>	wild thyme	x	xxx	
<i>Tragopogon pratensis</i>	goat's beard	x	x	xx
<i>Trifolium dubium</i>	lesser trefoil	xx	xx	xx
<i>Trifolium repens</i>	white clover	xx	x	xx
<i>Trifolium pratense</i>	red clover	xx	xx	xx
<i>Verbascum nigrum</i>	dark mullein	xx	xx	x
<i>Verbascum thapsus</i>	great mullein	xx	xx	x

**Key:**

x = tolerant

xx = well-suited

xxx = characteristic/indicator sp.

## *In Horto Feritas*

### FOR HEDGE AND WOODLAND HABITATS

SCIENTIFIC NAME	VERNACULAR NAME
<i>Alliaria petiolata</i>	hedge garlic
<i>Anthriscus sylvestris</i>	hedge parsley
<i>Arctium minus</i>	lesser burdock
<i>Arum maculatum</i>	lords and ladies
<i>Chamerion angustifolium</i>	rosebay willowherb
<i>Carex pendula</i>	pendulous sedge
<i>Clematis vitalba</i>	old man's beard
<i>Digitalis purpurea</i>	foxglove
<i>Dipsacus fullonum</i>	teasel
<i>Epilobium hirsutum</i>	great willowherb
<i>Galium mollugo</i>	hedge bedstraw
<i>Geum urbanum</i>	wood avens
<i>Hyacinthoides non-scripta</i>	bluebell
<i>Lamium album</i>	white dead-nettle
<i>Lonicera periclymenum</i>	honeysuckle
<i>Primula vulgaris</i>	primrose
<i>Silene dioica</i>	red campion
<i>Solanum dulcamara</i>	woody nightshade
<i>Stellaria holostea</i>	greater stitchwort
<i>Tamus communis</i>	black bryony
<i>Teucrium scorodonia</i>	wood sage

## *In Horto Feritas*

<i>Viola odorata</i>	sweet violet
<i>Viola riviniana</i>	common dog-violet

### WETLAND AND MESIC

SCIENTIFIC NAME	VERNACULAR NAME
<i>Alisma plantago-aquatica</i>	water plantain
<i>Alopecurus geniculatus</i>	marsh foxtail
<i>Angelica sylvestris</i>	wild angelica
<i>Apium nodiflorum</i>	fool's water-cress
<i>Arctium majus</i>	great burdock
<i>Bidens tripartita</i>	bur marigold
<i>Butomus umbellatus</i>	flowering rush
<i>Callitriche stagnalis</i>	common water-starwort
<i>Caltha palustris</i>	marsh marigold
<i>Carex riparia</i> (and other mesic sedges)	greater pond sedge, <i>etc.</i>
<i>Ceratophyllum demersum</i>	rigid hornwort
<i>Epilobium hirsutum</i>	great willowherb
<i>Filipendula ulmaria</i>	meadowsweet
<i>Geum rivale</i>	water avens
<i>Glyceria fluitans</i>	floating sweet-grass
<i>Iris pseudacorus</i>	yellow iris
<i>Juncus effusus</i> (and other rushes)	soft rush, <i>etc.</i>
<i>Lychnis flos-cuculi</i>	ragged robin

## *In Horto Feritas*

<i>Lycopus europaeus</i>	gipsywort
<i>Lythrum salicaria</i>	purple loosestrife
<i>Mentha aquatica</i>	water mint
<i>Myosotis laxa</i> ssp. <i>caespitosa</i>	tufted forget-me-not
<i>Myosotis scorpioides</i>	water forget-me-not
<i>Mriophyllum spicatum</i>	spiked water milfoil
<i>Nasturtium officinale</i>	water-cress
<i>Nuphar lutea</i>	yellow water-lily
<i>Oenanthe fistulosa</i> (and other <i>Oenanthe</i> spp BEWARE TOXICITY)	tubular water-dropwort, etc.
<i>Persicaria amphibia</i> (and other <i>Persicaria</i> spp)	amphibious bistort, etc.
<i>Potamogeton</i> spp	pondweeds
<i>Ranunculus aquatilis</i>	water crow-foot
<i>Ranunculus flammula</i>	lesser spearwort
<i>Veronica beccabunga</i>	brooklime

Regional distributions should be respected. Please obtain local seed/stock.

# *In Horto Feritas*

## APPENDIX IV: WILDLIFE HOMES & FEEDERS







As well as all the habitats you have or have created within the fabric of your wildlife garden – log piles, neglected corners, mini-meadow pond, rockery, hedgerow, *etc.* – there are many objects and devices to supplement them that you can make or purchase.

### Bird boxes

A huge range of designs for every species likely to visit a garden is now available, although you might find it more satisfying to make your own, either from a kit if you are not too much of a DIY-er or from scratch. Do, please, use high quality materials, avoid any toxic wood preservers and fasten the boxes securely in their final chosen position.

Try to put up your bird boxes well ahead of the nesting season, which starts in late February or March in most parts of Britain. Birds need to become habituated to the boxes before they are likely to use them. For birds to nest, they'll need to feel secure and not be too far from supplies of food and fresh water.











A few general rules are worth following:

- Position the box in shade so it does not bake in strong sun;
-  Angle entrance away from prevailing wind and downwards away from rain or ensure a sufficient overhang above it;
-  Fix securely (but no nails bashed into trees please – use expandable straps or ties) at least 1–3m above ground out of reach of cats and squirrels;
-  Place on the edge of bushes not in the middle of them;
-  Install away from bird tables and feeders to avoid territorial conflicts;
-  Keep regular food supplied during the fledgling stage;
-  Nest boxes should be able to be opened after the season to clean them out – extracting invertebrates from the old nesting material with a Tullgren funnel (see Appendix II);

## *In Horto Feritas*


### Bird tables feeders and baths

A multiplicity of designs of free-standing tables or suspended feeders can now be purchased whole or as kits but making one's own is more satisfying and greater fun. Think about:

-  Location – close enough to the house so you can observe the birds but not so close that they will be fearful, and well out of the way of cats;
-  If there are grey squirrels in your area, use one of the squirrel-proof feeders that have a strong metal cage around them that birds can enter but squirrels cannot, and suspend it from a metal pole that squirrels will find hard to climb – you can try mixing the food with cayenne pepper or strong chilli sauce to deter squirrels, too, as birds cannot taste it but squirrels certainly can;
-  For ground feeding, a wire cage “sanctuary” is a good idea so the birds can eat in safety from predators;
-  Avoid bird tables combined with nest boxes to avert territorial disputes;
-  When buying peanuts, ensure they are from a reputable source guaranteed free of aflatoxin;
-  Place bird baths away from shrubs where cats may lurk and keep them full of fresh, clean water;
-  Offer a variety of food, avoiding items such as cooking fat, margarine, polyunsaturated fats/oils, milk and rancid or mouldy food which may harm birds – the Royal Society for the Protection of Birds (RSPB) has approved brands, recipes and suggestions;
-  Mealworms (*Tenebrio molitor* Linnaeus 1758) are very popular with some birds and robins become cheeky enough to take them from your hand as you are putting them out, but these beetle larvae are rather expensive – you can raise your own by setting up a breeding colony of the beetles in a small barrel or large tin with layers of bran and slices of apple or potato (the RSPB has instructions);
-  Keep your feeders, tables and baths clean as avian diseases can be spread through contaminated food remains or dirty water – wash regularly with warm soapy water and a mild disinfectant, then rinse well;
-  Although birds in your wildlife garden will find plenty of food during spring, summer and early autumn so you can feed




## *In Horto Feritas*

them less between April & October, avoid suddenly withholding food, especially in cold weather or when nestlings are being fed, as the birds will have become accustomed to what you provide – make suitable arrangements if you are away;

-  Remember that birds will forage elsewhere in your garden, so make sure all those berrying shrubs, seeding trees & grasses and habitat corners mentioned in this book are in good shape.

### Bat boxes

When I was a boy, or even a young man, we never thought much about bats beyond exotic ones that carried rabies and those that were something of a pest eating the moths entering a light trap that one was trying to collect to photograph the next day. Then people began to notice that bats were disappearing, threatened, as is so much wildlife, by habitat change, as well as insecticides generally and roofing timber treatments in particular. How times have changed! Bats are now one of the better-protected taxa in Britain and there can be few people who are not aware that there are stiff penalties for harming these aerial mammals or their roosts. Contemporarily with their protection, general interest in bats has burgeoned and the availability of a large range of bat box designs with it.

-  At the time of writing there are eighteen species of bats recorded as resident in the UK. The greater mouse-eared bat (*Myotis myotis*) was regarded as extinct until a hibernating individual was recorded in a Sussex hibernaculum in December 2002 and Alcatheo's bat (*Myotis alcathoe*) was found here in 2010. The pond bat (*Myotis dasycneme*) may currently be in the process of colonising the country, based on an increase in recent sightings;
-  All British bats are insectivorous, feeding on a range of invertebrates from gnats to ground beetles and spiders. Two families of bats occur in the UK, the *Rhinolophidae* or “horseshoe bats” and the *Vespertilionidae* or “vesper bats”;
-  All British bats use high frequency sound (in the range 20–130 kHz approx.) as a form of echolocation. This allows





## *In Horto Feritas*

them to orientate themselves within their environment, detect and catch prey and communicate with other bats;

- ✂ Bats use a variety of different structures for the purposes of roosting, including mature trees, caves, mines, houses & other buildings (both modern and ancient), bridges and tunnels;
- ✂ Many bat species will occupy bat boxes (and sometimes bird boxes!) especially when there is good foraging at hand, as there will be in your wildlife garden;
- ✂ Bats use different types of roost at different times of year – maternity roosts are typically associated with warm, sheltered conditions whereas hibernation sites are characterised by stable temperatures and humidity approaching 100%;
- ✂ Bat boxes and roosting facilitators now come in many types and sizes from simple rough timber types for fixing to walls and trees to special tiles for roofs, designs that can be built into walls, large hibernation structures and conversion aids for lofts for bat colonies;
- ✂ The two species of pipistrelle and the brown long-eared bat are almost ubiquitous and all use bat boxes;
- ✂ Designs to attract particular species such as the noctule, Bechstein's bat or Daubenton's bat are available;
- ✂ Simple wooden boxes are made from rough-sawn timber but, in contrast to bird boxes, have a basal slit of about 15mm wide to allow bats access (but not birds);
- ✂ Boxes made from a mix of sawdust and concrete (coined "woodcrete") are now available on the market in many designs – they are durable, well-insulated, weather-proof and fairly predator-proof, and I can say from wide experience that they perform very well indeed, although they are relatively expensive at initial purchase;
- ✂ Choose locations high off the ground (at least 4m – more for noctules) and, as with bird boxes, pick a sheltered spot where the bats won't cook in the sun, freeze or be blasted by high winds – as bats usually adopt boxes quickly, try another spot if there are no bats present after a couple of years;
- ✂ You will be able to observe bats leaving an occupied box at dusk or returning at dawn in the warmer months or you can check for faeces to see if a box is occupied – bat droppings




## *In Horto Feritas*

are like those of mice but crumble easily with insect remains visible under a microscope (Experts can identify several bat species just from their faeces and there is even a DNA analysis service available now.);

-  Use a portable frequency-converter (“bat detector”) to help identification and monitor the bats’ movements;
-  Fix boxes very securely with correctly sized and installed wall fittings or strong, rot-proof double straps for trees (no nails in trees please);
-  Once occupied, do not disturb the box in any way unless emergency cleaning of a build-up of droppings is required – only do this when the bats are absent and note that many boxes are now designed to allow faeces to fall to the ground without build-up in the box;
-  **Never handle bats unless you have been trained and have an appropriate licence.** The only exception may be in an emergency to save them from obvious immediate harm or rescue them if injured, and always wear suitable protection against scratches and bites such as protective gloves and face mask as they can carry diseases such as lyssavirus that are pathogenic in humans – bat workers wisely have vaccinations against this disease as a matter of routine.


### Terrestrial mammal boxes


Dormouse and hedgehog boxes are probably the two garden species for which people most commonly supply shelters. Dormice sleep for much of the time and are secretive so, even if you are in the warmer places of Britain where they occur with old woodland or ancient hedgerows with plenty of hazel and honeysuckle, you may not see them. They do use boxes, though, and ones similar to traditional bird boxes can be made or are available commercially.

-  Choose boxes with a sliding roof as it is easier to inspect them without disturbance;
-  Locate them in old hedgerows or on trees but not too high off the ground (1–2m);
-  Remember that dormice are strictly protected in the UK.

## *In Horto Feritas*

Hedgehogs have become less common in recent years but still frequent gardens where they should be encouraged in every way possible as they consume large numbers of slugs and snails. Another nocturnal mammal, hedgehogs will use boxes as diurnal resting places or sometimes as a hibernation site.

 Most hedgehog boxes have a tunnel entrance to discourage cats and foxes;

 Place a generous layer of dry hay, straw or leaf litter in the box and stack logs around it for added protection, camouflage and insulation.

Other small mammals may use boxes in gardens – you may find wood mice or yellow-necked mice, especially if you site boxes similar to bumblebee boxes (below) low down along hedges or shrubbery edges where the mice are likely to forage.

Don't use capsaicin (cayenne/chilli) on food put out for mammals.

### Amphibian “houses”

Your pond and surrounds will probably already supply all the habitat our native amphibians need, but if you so desire, there are “houses” for frogs and toads on the market. Often made of ceramic to provide a cool, secure retreat, some have shelves at the rear designed for times when the animals are torpid. In truth, you can probably erect something just as effective and more in keeping with your garden with a few bricks and stones, unless, that is, you are a fan of the tree.

### Invertebrate “houses”

In your garden, insects will lay eggs, shelter or hibernate (as adults, larvae or pupae) in various places such as log piles, in bamboo canes, in walls, in dead hollow plant stems or seed cases and just about any nook and cranny in sheds or attics. Spiders and other arthropods will also use such places and many more.

## *In Horto Feritas*

The simplest invertebrate “houses” can be no more than a bundle of hollow bamboo sticks suspended in an out-of-the-way corner of the garden; commercially available insect shelters have become very popular. Most are based on providing accommodation for hibernating insects such as ladybirds, nymphalid butterflies, lacewings, *etc.* but some provide habitat for larvae of species such as masonry bees or certain beetles, or whole breeding nest boxes for species such as bumblebees.

- ✈ You can make a simple insect shelter with a bundle of cut bamboo canes as above, drinking straws or corrugated paper rolled inside a waterproof sleeve such as a plastic soft drinks bottle with the base removed, tilted downwards and with the cap sealed against rain;
- ✈ A similar structure that can be used suspended or placed on the ground is a log with holes drilled in it – this should also attract saproxylic invertebrates;
- ✈ Locate insect shelters where there will be good flying invertebrate populations such as near ponds, in hedges or shrubberies;
- ✈ You can purchase multiple-form invertebrate shelters commercially with slots for butterflies, honeycombs for ladybirds and the like, and various holes for lacewings, and for solitary bees and other *HYMENOPTERA*;
- ✈ For burrowing solitary bees you may have more success with a sunny earth bank or bare area of consolidated sand that an insect box;
- ✈ A brick or stone wall that is not structurally critical where you can bore holes with a masonry drill will attract various insects, too;
- ✈ Boxes for bumblebee nests are available, or can be constructed, that can be installed on or under the ground – locate them in the shelter of a hedge or wall if above ground, facing south but out of the direct sun and in an area where there will be plenty of flowers through the year but you will be lucky if you successfully attract a queen: increase your chances with an underground nest box.
- ✈ You can also keep your own honey bees – it is best to join your local bee-keeping group who will be friendly and helpful as well as a source for finding the equipment you need. My only advice would be to be sure you obtain queens bred from a docile strain. We once had some excellent

## *In Horto Feritas*

honey-producing bee hives whose occupants were a little too frisky and made the garden almost uninhabitable to us until my wife changed the queens!

With the availability of relatively cheap miniature cameras and Wi-Fi you can add a new dimension to watching the occupants of your boxes and feeders, making video records on computer or sharing them with friends, family and the world through the internet. There are now several such video kits on the market for home use, something for which naturalists of yore would have given their eye teeth.

## *In Horto Feritas*

### FOR YOUR NOTES

"...it Ver et Venus et Veneris praenuntius ante  
pennatus graditur, Zephyri vestigia propter  
Flora quibus mater praespargens ante viai  
cuncta coloribus egregiis et odoribus opplet;  
inde loci sequitur Calor aridus et comes una  
puluerulenta Ceres et etesia flabra Aquilonum;  
inde Autumnus adit, graditur simul Euius Euan;  
inde aliae tempestates ventique sequuntur,  
altitonans Voltumnus et Auster fulmine pollens;  
tandem Bruma nives adfert pigrumque rigorem reddit;  
hiemps sequitur crepitans hanc dentibus algu."  
Lucretius, *De rerum natura* 5.737-747.

I find that books about gardening seldom provide space for notes and readers end up jotting in margins or inside the covers. Making notes is something many of us are taught to do or adopt as we take an interest in one subject or another through life. The habit is one of which scientists through the ages have known the value for themselves and others that may follow, but it applies to many disciplines. For gardeners, it may simply be about the success or failure of plants in a particular position, unusual wildlife found, extremes of weather or perhaps phenology. The quotation above, though, from Lucretius' famous writings describing the flow and sequence of the seasons, seems apt and may suggest one way of ordering your notes so I have allowed a couple of pages for each.

# *In Horto Feritas*

Spring



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Summer



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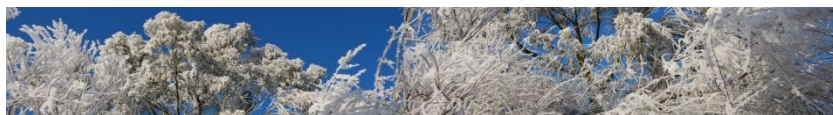
Autumn



# *In Horto Feritas*

# *In Horto Feritas*

Winter



# *In Horto Feritas*

# *In Horto Feritas*

## INDEX FOR MAIN TEXT

- Acer campestre*, 62  
*Acer* spp, 65  
*Achillea*, 50  
*Achillea millefolium*, 37, 40, 41, 43, 77  
Aegean wallflower, 78  
*Agrostis capillaris*, 36, 41, 42  
*Agrostis stolonifera*, 36, 43  
*Ajuga reptans*, 40, 70  
alder, 62  
alder buckthorn, 62  
algae, 10, 11, 24  
Alien invaders, 3, 19  
*Alisma plantago-aquatica*, 82  
*Alliaria petiolata*, 62  
*Allium karataviense*, 77  
*Allium schoenoprasum*, 36  
almonds, 66  
*Alnus glutinosa*, 62  
*Alopecurus genicalutus*, 43  
*Alopecurus geniculatus*, 82  
*Alopecurus pratensis*, 42  
alpine meadow-grass, 36  
*Alyssum*, 51  
*Alyssum montanum*, 37  
*Alyssum saxatile*, 37  
*Alyssum* spp, 77  
*Amelanchier lamarckii*, 65  
amphibians, 10, 79, 81  
amphibious bistort, 83  
*Anemone nemorosa*, 62, 70  
annual meadow-grass, 34, 76  
*Anthemis tinctoria*, 37  
*Anthoxanthum odoratum*, 41, 42  
ants, 9, 19, 24, 28, 86  
aphid control, 57  
aphids, 33, 53, 54, 55, 56, 57  
*Apium nodiflorum*, 82  
*Aponegeton distachyos*, 84  
apples, 66  
aquatic vegetation, 80  
*Arabis alpina* ssp. *caucasica*, 77  
arachnids, 10  
*Arbutus*, 65  
*Arenaria serpyllifolia*, 37, 73, 77  
*Armeria maritima*, 37, 77  
*Arrhenatherum elatius*, 42, 74, 75  
arthropods, 45, 48  
*Arum maculatum*, 70  
ash, 8, 9, 11, 62  
*Asperula cynanchica*, 44  
*Asplenium ruta-muraria*, 73, 74, 76  
*Asplenium scolopendrium*, 69  
*Asplenium trichomanes*, 73, 74, 77  
*Asplenium trichomanes-ramosum*, 73  
*Asplenium viride*, 74  
asters, 50  
*Athyrium filix-femina*, 69  
*Aubrieta*, 51, 77  
*Aurinia saxatilis*, 77  
autumn gentian, 44  
autumn hawkbit, 9, 42  
*Avenula pratensis*, 43  
bacteria, 86  
bank haircap, 72  
barberry, 8  
*Barbilophozia floerkei*, 72  
barkflies, 11  
bat, 5, 11, 17, 31, 79  
bat boxes, 55  
bat detector, 25  
bats, 13, 18, 24, 25, 61, 80  
bats, 8, 24  
bearded irises, 52  
bed bugs, 24  
beech, 61, 62  
bees, 11, 39, 49, 50, 51  
bees, 3, 50  
beetles, 11, 19, 24, 79, 85, 86  
beetroot, 54  
bell heather, 42  
bellflowers, 77  
*Bellis perennis*, 14, 40, 43  
*Berberis darwinii*, 60  
*Betula* spp, 65  
bilberry, 40, 72  
biodiversity, 2, 5, 10, 68  
biological diversity, 20  
Biological Record Centre, 5, 9  
biological recording programs, 9  
birches, 65  
bird boxes, 3, 8  
bird cherry, 63  
bird table, 8  
bird-bath, 8  
birds, 5, 9, 10, 13, 16, 17, 18, 19, 24, 25, 26, 28, 29, 31, 39, 48, 50, 53, 54, 56, 58, 61, 65, 66, 67, 78, 86

## In Horto Feritas

- birds' eggs, 17  
birds' nests, 17  
biting stonecrop, 36, 74, 76  
black medick, 40, 44  
blackbird, 8, 26  
blackbirds, 39, 53  
blackspot, 56  
blackthorn, 9, 61, 63  
bladder campion, 36  
*Blechnum spicant*, 69  
bloody crane's-bill, 36  
blue moor-grass, 36  
blue tit, 8, 53  
bluebell, 52, 62, 70  
bog arum, 84  
bones, 18  
book lice, 11  
boom-and-bust, 48, 55  
*Brachypodium pinnatum*, 43  
*Brachypodium sylvaticum*, 74  
*Brachythecium albicans*, 41  
*Brachythecium rutabulum*, 43  
breckland thyme, 36  
bristle-leaved bent, 41  
bristletails, 10  
brittle bladder-fern, 73  
*Briza media*, 43, 50  
broad buckler-fern, 69  
broad-leaved meadow-grass, 36  
*Bromopsis erecta*, 43  
*Bromus erectus*, 37  
brooklime, 9, 83  
broom fork-moss, 72, 74  
bryophytes, 40, 61, 72, 73, 74, 78  
buck's-horn plantain, 75  
*Buddleia*, 51, 60, 77  
*Buddleia davidii*, 60  
*Buddleia globosa*, 60  
bugle, 40, 51, 70  
bulbous buttercup, 42  
bulrush, 84  
burnet-saxifrage, 44  
busy-Lizzie, 28  
buttercups, 40  
butterflies, 11, 16, 19  
cabbage whites, 53  
cabbages, 54  
caddisflies, 11  
*Calamagrostis epigejos*, 70  
calicolous vegetation, 75  
*Calendula*, 54  
*Calla palustris*, 84  
*Calliergonella cuspidata*, 74  
*Callitriche stagnalis*, 82  
*Calluna vulgaris*, 42  
*Caltha palustris*, 83  
*Calystegia sepium*, 77  
*Campanula carpatica*, 77  
*Campanula rotundifolia*, 36, 44  
*Campanula trachelium*, 62, 70  
*Campsis*, 8, 27  
*Campylopus flexuosus*, 72  
candytuft, 28, 51  
candytufts, 78  
cape-pondweed, 84  
caper spurge, 55  
capsaicin, 54  
*Cardamine flexuosa*, 34  
*Carex caryophylllea*, 44  
*Carex flacca*, 36, 44, 74  
*Carex humilis*, 36  
*Carex pendula*, 70  
*Carex riparia*, 83  
*Carex sylvatica*, 70  
*Carpinus betulus*, 62  
carrion crows, 39  
carrot flies, 55  
carrots, 54  
carrying capacity, 19  
cat's-ear, 9, 42  
*Catapodium rigidum*, 77  
caterpillars, 28, 54  
catmint, 51  
cats, 29  
*Ceanothus 'Blue Mound'*, 58  
*Ceanothus thyrsiflorus*, 58  
*Ceanothus x delileanus*, 58  
*Centaurea nigra*, 43  
*Centaurea scabiosa*, 75  
*Centaureum erythraea*, 36  
centipedes, 24, 79, 86  
*Centranthus*, 9  
*Centranthus ruber*, 37  
*Cerastium fontanum*, 42  
*Cerastium semidecandrum*, 77  
*Cerastium tomentosum*, 37  
*Ceratophyllum demersum*, 83  
*Chaenomeles japonica*, 58  
chaffinch, 8, 27  
chalk comb-moss, 73, 74  
*Chamaemelum nobile*, 40  
chameleon plant, 84  
chamomile, 40, 54  
chasmophytic vegetation, 73, 74, 75  
cherries, 66  
chillies, 54

# In Horto Feritas

- Chimonanthus praecox*, 52  
chives, 36, 54  
*Choisya ternata*, 52  
*Ciconia ciconia*, 26  
*Cirsium* 'Atropurpureum', 50  
*Cirsium acaule*, 44  
*Cladonia*, 41, 44  
*Cladonia pocillum*, 73, 74  
*Clarkia*, 28  
classification, 3, 14, 40  
clematis, 8, 27, 51  
*Clematis flammula*, 52  
*Clematis vitalba*, 63  
climbers, 8, 26, 27, 31  
clovers, 8, 40, 78  
cobweb house-leek, 36  
cock's-foot, 42, 75  
cockroaches, 10, 24, 79  
Codes of Practice, 16  
collecting, 1, 16, 17, 28  
colonisation, 19, 20  
common bent, 9, 36, 41, 42  
common bird's-foot-trefoil, 9, 36, 40,  
41, 42, 44  
common centaury, 36  
common cornsalad, 77  
common dog-violet, 41, 62, 70, 75  
common frogs, 9  
common fumitory, 36  
common house-leek, 36  
common knapweed, 9, 43  
common mallow, 36  
common mouse-ear, 42  
common pawwort, 72  
common polypody, 77  
common ragwort, 41, 44  
common reed, 84  
common rockrose, 36  
common rock-rose, 44  
common rock-rose, 74  
common sorrel, 43, 44  
common water-starwort, 82  
common whitebeam, 63  
compost heap, 3, 9, 53, 86  
composts, 33  
consumers, 22  
*Convallaria majalis*, 52, 62, 70  
copper-leaved hazel, 8  
corncockle, 28  
cornflower, 28, 49  
*Cornicularia aculeata*, 41  
*Cornus kousa*, 66  
*Cornus mas*, 66  
*Cornus sanguinea*, 62  
*Coronilla valentina*, 52  
*Corvus monedula*, 26  
*Corylus avellana*, 60, 62  
Cosmos, 49  
Cotoneaster, 60  
crab apple, 9, 63  
*Crataegus monogyna*, 61, 62  
*Crataegus* spp, 66  
creeping bent, 36, 43  
creeping cinquefoil, 40  
*Crepis capillaris*, 44, 77  
crested dog's-tail, 9, 36, 42  
crested hair-grass, 43, 74  
crickets, 11, 18, 24  
crisped neckera, 75  
crocus, 51  
*Crocus* spp, 78  
crustaceans, 10  
*Cryptogramma crispa*, 72, 73  
*Ctenidium molluscum*, 73, 74  
curly crisp-moss, 74  
cutting regimes, 3, 45  
cyanobacteria, 11  
*Cyclamen*, 49  
*Cydonia oblonga*, 66  
*Cymbalaria muralis*, 76, 77  
*Cynosurus cristatus*, 36, 42  
cypress-leaved plait-moss, 72, 74, 75  
*Cystopteris fragilis*, 73, 74  
*Cytisus*, 60  
*Dactylis glomerata*, 42, 75  
daisies, 8, 9, 14, 51  
daisy, 15, 39, 40, 43  
damselflies, 9, 85  
damson, 63  
dandelion, 15, 40, 43, 44  
*Daphne*, 52  
*Daphne laureola*, 70  
*Daphne mezereum*, 70  
*Daucus carota*, 37, 75, 76  
dead wood, 5, 53, 67  
decomposers, 19, 22, 28, 68, 79, 86  
*Delichon urbicum*, 25  
delphiniums, 9  
*Deschampsia cespitosa*, 42  
*Deschampsia flexuosa*, 37, 41, 72, 73  
*Dianthus*, 52, 78  
*Dianthus deltoides*, 37  
*Dicranum scoparium*, 41, 72, 74  
digital photography, 7  
*Digitalis purpurea*, 70  
*Diplophyllum albicans*, 72

# In Horto Feritas

- Dodecatheon* spp, 84  
dog rose, 9, 63  
dog's mercury, 62, 70, 75  
dogs, 28  
dogwood, 62, 66  
doves, 39  
*Draba aizoides*, 76  
*Dracocephalum* spp, 84  
dragonfly, 9, 10, 13, 18, 80  
dragonheads, 84  
drawings, 14  
dry stone walls, 71  
*Dryas octopetula*, 37  
*Dryopteris filix-mas*, 69  
dwarf onions, 77  
dwarf sedge, 36  
dwarf thistle, 44  
earthworms, 11, 79  
earwigs, 11, 24, 79  
ecology, 5, 14, 19, 22, 23, 55  
ecosystem, 5, 17, 19, 23, 39, 53, 80, 86  
ecosystem services, 34  
elder, 63  
electric propagator, 33  
*Encalypta streptocarpa*, 74  
endoscope, 79  
English elm, 63  
English stonecrop, 36  
*Enkianthus campanulatus*, 58  
*Epilobium hirsutum*, 83  
*Eranthis hyemalis*, 78  
*Erica cinerea*, 42  
*Erithacus rubecula*, 27  
*Eryngium planum*, 50  
*Erysimum*, 49  
*Erysimum cheiri*, 78  
*Escallonia* 'E.F. Ball', 58  
*Euonymus europaeus*, 62  
*Euphorbia amygdaloides*, 62, 70  
*Euphorbia portlandica*, 75  
*Euphrasia officinalis*, 40  
European Network for Biodiversity Information, 9  
exotic species, 17, 19, 20  
exotic versus native plants, 48  
exuviae, 18  
eyebright, 40  
*Fagus sylvatica*, 62  
fairy flax, 44  
false brome, 74  
false oat-grass, 42, 74  
feathers, 1, 18  
fern-grass, 77  
ferns, 11, 68, 72, 74  
fertilizers, 39, 54  
*Festuca ovina*, 37, 41, 72, 74  
*Festuca rubra*, 37, 41, 42, 74, 75  
field maple, 62  
field mice, 39  
field wood-rush, 43  
*Filipendula ulmaria*, 43  
fine-leaved sandwort, 36  
fir clubmoss, 72  
fish, 9, 10, 18, 81, 82  
*Fissidens dubius*, 74  
flatworms, 11  
fleas, 22, 24  
flies, 11, 24, 53, 79  
floating sweet-grass, 83  
flower beds, 17, 48, 49  
flowering cherry, 9  
flowering plants, 11, 39, 47, 69  
flowering tobacco, 52  
food chains, 22  
food web, 17, 22, 48, 56  
fool's water-cress, 82  
forget-me-nots, 51  
*Forsythia*, 60  
fossils, 1, 18, 29  
foxes, 39  
foxtail, 50, 51, 70  
*Frangula alnus*, 62  
*Fraxinus excelsior*, 62  
*Fringilla coelebs*, 27  
*Fritillaria meleagris*, 43  
frizzled crisp-moss, 74, 75  
frog, 24, 55  
fuchsia gall mite, 20  
*Fumaria officinalis*, 36  
fungi, 1, 11, 18, 22, 53, 68, 86  
*Gaillardia*, 50  
*Galanthus nivalis*, 78  
*Galium mollugo*, 62, 70  
*Galium odoratum*, 62, 70  
*Galium saxatile*, 41, 72  
*Galium sterner*, 74  
*Galium verum*, 41, 43, 44  
garden shed, 8  
garlic, 54  
garlic mustard, 62  
gastropods, 33  
*Gazania*, 49  
genera, 10, 14, 66  
*Gentianella amarella*, 44  
genus, 14, 78

# In Horto Feritas

- Geranium robertianum*, 62, 70, 75  
*Geranium sanguineum*, 36  
*Geranium sylvaticum*, 70  
geraniums, 50  
germander speedwell, 62  
*Geum*, 50  
*Geum urbanum*, 70  
glaucous sedge, 36, 44, 74  
glittering wood-moss, 75  
*Glyceria fluitans*, 83  
goat's beard, 15, 44  
gold-dust, 77  
golden rain tree, 66  
goldenrod, 50  
grass, 3, 9, 39, 40, 41, 45, 72  
grass snake, 9  
grasshoppers, 10  
gravel, 18, 29  
gravel gardens, 71  
great burnet, 43  
great crested newt, 17  
great mullein, 36  
great willow-herb, 83  
great woodrush, 70  
greater knapweed, 75  
greater pond-sedge, 83  
greater stitchwort, 62, 70  
green corridors, 5  
green roof, 8, 34, 36, 71  
green spleenwort, 73  
greenhouse, 1, 3, 17, 18, 23, 24, 31, 57  
green-tufted stubble-moss, 74  
grey-cushioned grimmia, 76  
*Grimmia apocarpa*, 75, 76  
*Grimmia pulvinata*, 76  
guelder-rose, 63  
*Gymnocarpium robertianum*, 75  
hanging baskets, 27  
hard fern, 69  
hard shield-fern, 69  
harebell, 36, 44  
hart's-tongue, 69  
harvestmen, 10, 79  
hawthorn, 8, 9, 61, 62, 63  
hay meadow, 9, 42  
hazel, 9, 59, 62  
heath bedstraw, 41, 72  
heath wood-rush, 40  
heather, 40, 42, 50, 51  
*Hedera helix*, 27, 61, 63, 75  
hedge, 8, 9, 60, 61, 63, 65, 70  
hedge bindweed, 77  
hedge-bedstraw, 62  
hedgehog, 8, 13, 28, 31, 39, 55  
hedgehog house, 28  
Hedgerow Evaluation and Grading System, 60  
hedgerows, hedges, 3, 5, 49, 56, 59, 60, 61, 62  
Hedgerows Regulations, 60  
*Helenium*, 50  
*Helianthemum nummularium*, 36, 44, 74  
heliophytes, 71  
hellebores, 50, 51  
hen-and-chickens, 36  
herbicides, 16, 51  
herb-Robert, 62, 70, 75  
herons, 9  
*Hesperis matronalis*, 52  
Hickin, 2, 24  
*Hirundo rustica*, 25  
hoary cinquefoil, 36  
hoary plantain, 44  
*Holcus lanatus*, 37, 42  
holly, 8, 9, 61, 62, 66  
hollyhocks, 50, 51  
*Homalothecium lutescens*, 44  
*Homalothecium sericeum*, 74, 75, 76  
honesty, 51  
honeysuckle, 9, 27, 52, 63  
hop, 63  
*Hordelymus europaeus*, 70  
hornbeam, 62  
horsetails, 11  
house martin, 8, 25  
house sparrow, 25  
*Houttuynia cordata*, 84  
hoverflies, 5, 54  
*Humulus lupulus*, 63  
humus, 54  
*Huperzia selago*, 72  
hyacinth, 52  
*Hyacinthoides non-scripta*, 52, 62, 70  
*Hyacinthus orientalis*, 52  
*Hydrangea anomala*, 27  
*Hydrocleis nymphoides*, 84  
*Hylocomium splendens*, 41, 75  
*Hypericum perforatum*, 37  
*Hypnum cupressiforme*, 41, 72, 74, 75  
*Hypochaeris radicata*, 42  
*Iberis*, 9, 78  
*Ilex aquifolium*, 62  
*Ilex* hybrids and varieties, 66  
*Ilex x altaclerensis*, 66

## In Horto Feritas

- insect boxes, 28  
insectivorous plants, 85  
insects, 1, 9, 10, 13, 31, 33, 48, 50, 51, 54  
invertebrates, 5, 17, 18, 19, 24, 27, 35, 39, 48, 55, 61, 69, 81, 85  
*Iris pseudacorus*, 83  
*Iris* varieties, 84  
ivy, 8, 24, 27, 61, 63, 75  
ivy-leaved toadflax, 76  
jackdaw, 26  
Japanese knotweed, 20  
Japanese maple, 8  
Japanese quince, 51  
*Jasione montana*, 37  
*Jasminum officinale*, 27, 52  
jays, 39  
Jerusalem artichokes, 55  
*Jovibarba sobolifera*, 36  
*Juncus effusus*, 83  
*Juncus* spp, 83  
juneberry, 65  
*Juniperus communis*, 60  
kestrels, 39  
*Kniphofia*, 50  
*Koeleria macrantha*, 43, 74  
*Koelreuteria paniculata*, 66  
*Kolkwitzia amabilis*, 58  
Korean spice viburnum, 52  
lacewings, 11, 24, 55, 57  
lady's bedstraw, 9, 41, 43, 44  
ladybirds, 55, 57  
lady-fern, 69  
*Lamiastrum galeobdolon*, 62, 70  
*Lamium album*, 70  
*Lamium purpureum*, 70  
*Laurus nobilis*, 60  
laurustinus, 51  
*Lavandula*, 52, 60  
lavender, 37  
lavenders, 51  
Lavenders, 50  
*Lavendula augustifolia*, 37  
lawn, 1, 8, 14, 26, 39, 45  
lawns, 39  
leatherjackets, 53  
*Leontodon autumnalis*, 42  
*Leontodon hispidus*, 44  
lesser celandine, 62, 70  
*Leucanthemum vulgare*, 43  
*leylandii*, 61  
lice, 11, 24  
licence, 17, 25  
lichens, 9, 11, 18, 24, 40, 41, 43, 44, 61, 72, 78  
*Ligustrum vulgare*, 61, 62  
lilac, 52  
lilies, 52  
*Lilium*, 52  
lily beetle, 19  
lily-of-the-valley, 52, 62, 70  
limestone bedstraw, 74  
limestone fern, 75  
*Linaria vulgaris*, 37  
Linnaean system, 14  
*Linum catharticum*, 44  
little mouse-ear, 77  
liverworts, 11, 24, 68, 69  
living walls, 3, 34  
lizard's tail, 85  
*Lobularia maritima*, 78  
logs, 17, 68, 78, 79, 86  
*Lolium perenne*, 42  
*Lonicera fragrantissima*, 52  
*Lonicera periclymenum*, 27, 52, 63  
loosestrifes, 50  
*Lophozia ventricosa*, 72  
lords-and-ladies, 70  
*Lotus corniculatus*, 36, 40, 41, 42, 44  
love-in-a-mist, 28  
*Luzula campestris*, 43  
*Luzula multiflora*, 40  
*Luzula sylvatica*, 70  
*Lythrum*, 50  
*Magnolia denudata*, 58  
*Magnolia liliiflora*, 58  
*Magnolia soulangiana*, 58  
magpies, 39  
*Mahonia*, 51, 60  
maiden pink, 37  
maidenhair spleenwort, 73, 77  
male-fern, 69  
*Malus sylvestris*, 63  
*Malva sylvestris*, 36  
mammals, 10, 13, 19, 31, 48, 65  
manure, 54, 57, 78, 86  
manure tea, 57  
maples, 65  
marigolds, 51, 54  
marjoram, 37, 51, 75, 78  
marsh foxtail, 43, 82  
marsh marigold, 83  
mat-grass, 72  
*Matthiola incana*, 52  
mayflies, 10, 85  
meadow buttercup, 9, 43

# In Horto Feritas

- meadow fescue, 42  
meadow foxtail, 42  
meadow saxifrage, 37  
meadow vetchling, 9, 43  
meadowsweet, 43  
mealy bug, 33  
*Medicago lupulina*, 40, 44  
*Melica uniflora*, 70  
*Mentha aquatica*, 83  
*Mentha* spp, 78  
*Mercurialis perennis*, 62, 70, 75  
Mesotrophic grasslands, 3, 42  
Mexican orange blossom, 52  
mezereon, 70  
mice, 33, 55  
microbes, 19, 24, 68  
microhabitats, 61  
Midland hawthorn, 9, 62, 66, 108, 121  
mildew, 56  
*Milium effusum*, 70  
millipedes, 10, 79  
*Mimulus*, 49  
*Mimulus* spp, 84  
mini-meadow, 40  
mints, 51, 54, 78  
*Minuartia hybrida*, 26  
*Minuartia verna*, 37  
mistle thrush, 26  
mites, 1, 10, 53, 86  
mock-orange, 52  
moles, 39  
molluscs, 10  
*Monarda*, 50  
monkey flower, 84  
moss pink, 78  
mosses, 9, 11, 24, 39, 41, 43, 44, 68, 69  
moths, 11, 17, 19, 24, 28, 69  
moulds, 24  
mountain alison, 37  
mountain avens, 37  
mouse-ear hawkweed, 37  
mouse-ear hawkweed, 41, 44  
*Muscari*, 51  
*Muscicapa striata*, 27  
*Mycelis muralis*, 75  
*Myosotis laxa* ssp. *caespitosa*, 83  
*Myosotis scorpioides*, 83  
*Myotis*, 25  
myriapods, 10  
*Myriophyllum spicatum*, 83  
*Narcissus*, 52  
*Narcissus pseudonarcissus*, 70  
*Nardus stricta*, 40, 72  
*Nasturtium*, 49  
*Nasturtium officinale*, 83  
nasturtiums, 54  
National Biodiversity Network, 9  
National Vegetation Classification, 61, 72, 73, 74, 75, 76, 77, 80  
Natterer's bat, 25  
Natura 2000, 73, 74, 75, 76, 77  
Natural History Museum, 1, 9  
navelwort, 78  
*Neckera crispa*, 75  
nectar, 8, 22, 27, 33, 35, 48, 50, 51, 58, 59, 66, 77  
nectarines, 66  
neighbours, 18  
nekton, 81  
nest boxes, 25, 26, 31  
nesting sites, 59, 61  
nettle-leaved bellflower, 62, 70  
nettles, 86  
New Zealand flatworm, 20  
newts, 9, 79, 81, 83  
*Nicotiana*, 28, 49  
Norway maple, 65  
*Nuphar lutea*, 83  
*Nymphaea alba*, 84  
oak, 1, 8, 9, 19, 63  
Odum, 22  
*Onopordum*, 50  
opportunists, 48  
oregano, 54, 78  
organic gardening, 53, 54  
*Origanum vulgare*, 37, 75  
ornamental *Prunus*, 51  
ornamental thistles, 51  
*Osmanthus burkwoodii*, 52  
owls, 39  
*Oxalis acetosella*, 62, 70, 72, 75  
oxeye daisy, 9, 43  
Palaeartic Habitat, 61, 76, 77  
parasites, 17, 48  
*Parietaria judaica*, 75, 76  
parsley fern, 72  
*Parthenocissus quinquefolia*, 27  
*Passer domesticus*, 25  
paving, 3, 17, 18, 71  
peaches, 66  
pears, 66  
pedunculate oak, 61  
pellitory-of-the-wall, 75, 76  
pendulous sedge, 70  
*Pennisetum*, 50

# In Horto Feritas

- pepper-saxifrage, 43
- perennial rye-grass, 42
- perforate St. John's-wort, 37
- perfume, 51
- Persicaria amphibia*, 83
- pesticides, 16, 33, 39, 51
- pets, 28
- Petunia*, 28, 49
- Phase 1, 7
- Philadelphus*, 52
- Phleum pratense*, 42
- phlox, 50
- Phlox subulata*, 78
- photography, 17
- photosynthesis, 22
- Phragmites australis*, 84
- pickerel plant, 85
- pigeons, 39, 53
- Pilosella officinarum*, 37, 41, 44
- Pimpinella saxifraga*, 44
- pipistrelle, 8, 25
- Pipistrellus*, 25
- Plantago coronopus*, 75
- Plantago lanceolata*, 40, 41, 43, 44, 76
- Plantago media*, 44
- Plecotus*, 25
- Pleurozium schreberi*, 41, 72
- plums, 66
- Poa alpina*, 36
- Poa annua*, 34, 76, 77
- Poa chaixii*, 36
- Poa pratensis*, 37, 42
- Poa trivialis*, 42
- poached egg plant, 28, 51
- pointed spear-moss, 74
- pollen, 27, 35, 50
- Polypodium vulgare*, 77
- Polystichum aculeatum*, 69
- Polytrichastrum formosum*, 72
- Polytrichum piliferum*, 41
- pond, 5, 9, 10, 13, 25, 28, 51, 55, 80, 81, 82, 84
- pondweeds, 83
- Pontederia cordata*, 85
- poppies, 9, 49
- Porella platyphylla*, 74
- Portland spurge, 75, 76
- postcode plants, 9
- pot marigold, 28
- Potamogeton* spp, 83
- Potentilla anserina*, 43
- Potentilla argentea*, 36
- Potentilla erecta*, 41
- Potentilla reptans*, 40
- predators, 17
- primrose, 70
- primroses, 49
- Primula*, 9
- Primula* spp, 85
- Primula vulgaris*, 70
- privet, 61
- procumbent pearlwort, 40
- producers, 22
- propagating ferns, 69
- propagules, 17, 20, 32, 44, 78
- Protozoa, 80
- Prunella vulgaris*, 40, 43, 44
- Prunus padus*, 60
- Pseudoscleropodium purum*, 41
- Pteridium aquilinum*, 41
- puddled clay, 82
- purple saxifrage, 37, 78
- pussy willow, 66
- Pyracantha*, 60
- Pyrus pyraster*, 63
- quaking-grass, 43
- Quercus robur*, 63
- quinces, 66
- Racomitrium lanuginosum*, 72
- rainwater, 33
- Ranunculus*, 40
- Ranunculus acris*, 43
- Ranunculus aquatilis*, 83
- Ranunculus bulbosus*, 42
- Ranunculus ficaria*, 62, 70
- recording forms, 10
- red campion, 62, 70
- red clover, 43, 44
- red dead-nettle, 70
- red fescue, 9, 37, 41, 42, 74, 75
- red hot poker, 50
- red pepper, 54
- red spider, 33
- red valerian, 37
- red-stemmed feather-moss, 72
- reflexed stonecrop, 37
- reptiles, 10
- Reseda lutea*, 37
- Rhinanthus minor*, 43
- rhubarb, 55
- ribwort plantain, 40, 41, 43, 44, 76
- rigid hornwort, 83
- robin, 26
- robins, 39, 48, 86
- rock cress, 77

# In Horto Feritas

- rock pocket-moss, 74  
rockeries, 71  
rockery, 9  
rock-roses, 78  
rocks, 1, 9, 18, 29, 42, 69, 71, 72, 74,  
76, 77, 79  
rodents, 24  
rooks, 39  
*Rosa canina*, 63  
rose beds, 3, 56  
rose diseases, 56  
rosemary, 54  
roses, 27, 50, 52, 56, 57  
rosette pixie-cup lichen, 73, 74  
*Rosmarinus officinalis*, 60, 78  
rough hawkbit, 44  
roundworms, 11  
rowan, 8, 63  
Royal Horticultural Society, 20, 48  
Royal Society for the Protection of  
Birds, 29  
rue-leaved saxifrage, 77  
*Rumex acetosa*, 43, 44  
*Rumex acetosella*, 41  
rust, 56  
rusty swan-neck moss, 72  
sage, 50, 51  
*Sagina procumbens*, 40  
salad burnet, 44, 76  
*Salix*, 66  
*Salvia*, 49, 50  
*Sambucus nigra*, 60, 63  
*Sanguisorba minor*, 44, 76  
*Sanguisorba officinalis*, 43  
saproxylic invertebrates, 67  
*Sarcococca*, 51, 52  
*Saururus cernuus*, 85  
saw-flies, 69  
saxicolous flowering plants, 71  
saxicolous habitat, 9  
*Saxifraga granulata*, 37  
*Saxifraga oppositifolia*, 37, 78  
*Saxifraga tridactylites*, 77  
*Scabiosa columbaria*, 44  
*Scabiosa japonica*, 50  
scale, 33  
scent, 3, 51  
*Scleropodium purum*, 44  
scorpionflies, 11  
scramblers, 27  
*Sedum*, 78  
*Sedum acre*, 36, 74, 76  
*Sedum album*, 37  
*Sedum anglicum*, 36  
*Sedum rupestre*, 37  
*Sedum sexangulare*, 37  
*Sedum spectabile*, 9  
*Sedum spectabilis*, 50  
sedums, 8, 35  
selective herbicides, 8  
selective weed-killers, 39  
selfheal, 40, 43, 44  
*Sempervivum arachnoideum*, 36  
*Sempervivum tectorum*, 36  
*Senecio jacobaea*, 41, 44  
*Sesleria albicans*, 36  
sessile grimmia, 75, 76  
shade, 68  
shady habitats, 68  
sheds, 31  
sheep's fescue, 37, 41, 72, 74  
sheep's sorrel, 41  
sheep's-bit scabious, 37  
shooting stars, 84  
shrews, 39  
shrubby honeysuckle, 52  
*Silvaum silaus*, 43  
*Silene dioica*, 62, 70  
*Silene vulgaris*, 36  
silky wall feather-moss, 74, 75, 76  
silverfish, 24  
silverweed, 43  
*Skimmia japonica*, 60  
sloughed skins, 18  
slow-worm, 9  
slug bait, 9  
slug traps, 53  
slugs, 10, 53, 55, 79  
small scabious, 44  
small-leaved lime, 63  
smooth hawk's-beard, 44, 77  
smooth meadow-grass, 37  
smooth newts, 9  
snail shells, 18  
snails, 10, 19, 53, 55, 79  
snake's head fritillary, 43  
snapdragons, 49  
snowdrops, 8, 51, 78  
snow-in-summer, 37  
snowy mespilus, 65  
soft rush, 83  
soil, 18  
Soil Association, 54  
song thrush, 26  
*Sorbus aucuparia*, 63  
*Sorbus* spp and varieties, 67

## In Horto Feritas

- spearmint, 55  
Species 2000 Europa, 9  
speedwell, 8, 70  
spiders, 5, 10, 19, 79  
spiked water milfoil, 83  
spindle, 62  
spiral extinguisher-moss, 74  
spotted flycatcher, 27  
spring sandwort, 37  
spring-sedge, 44  
springtails, 10, 79  
spurge-laurel, 70  
spurges, 51  
squinancywort, 44  
squirrels, 1, 20, 39, 53, 54  
standing dead wood, 67  
star jasmine, 27, 52  
starling, 26, 39  
star-of-Bethlehem, 51  
*Stellaria holostea*, 62, 70  
stoats, 39  
stocks, 52  
stoneflies, 10, 85  
stones, 3, 17, 18, 28, 29, 79  
stoneworts, 11  
strawberry tree, 65  
stream, 10, 80, 85  
*Sturnus vulgaris*, 26  
summer jasmine, 27, 52  
sunflowers, 49  
sweet alyssum, 78  
sweet peas, 52  
sweet rocket, 52  
sweet vernal-grass, 9, 41, 42  
sweet violet, 52, 70  
sycamore, 65  
*Syringa vulgaris*, 52  
*Tagetes*, 54  
*Taraxacum officinale*, 40, 43, 44  
tasteless stonecrop, 37  
*Taxus baccata*, 63  
*Teucrium chamaedrys*, 37  
*Teucrium scorodonia*, 75  
thrift, 37, 77  
thrushes, 39, 48, 86  
thyme-leaved sandwort, 37, 73, 77  
thymes, 51, 54, 78  
*Thymus polytrichus*, 37, 44, 74  
*Thymus serpyllum*, 36  
*Thymus* spp, 78  
ticks, 24  
*Tilia cordata*, 63  
timothy, 42  
toadflax, 37, 76  
toads, 24, 55, 79  
tomatoes, 54  
tor-grass, 43  
*Torilis japonica*, 62, 70  
tormentil, 41  
*Tortella tortuosa*, 74, 75  
*Tortula muralis*, 76  
*Trachelospermum jasminoides*, 27, 52  
*Tragopogon pratensis*, 44  
traps, 17, 55  
traveller's-joy, 63  
trees, 1, 8, 9, 27, 60, 65, 67  
*Trichostomum crispulum*, 74  
*Trifolium*, 40, 44, 78  
*Trifolium pratense*, 43  
*Trifolium repens*, 43  
*Trisetum flavescens*, 37, 42  
*Troglodytes troglodytes*, 27  
true flies, 69  
trumpet of Jericho, 27  
tufted forget-me-not, 83  
tufted hair-grass, 42  
tumid notchwort, 72  
*Turdus merula*, 26  
twiners, 27  
*Typha minima*, 9  
*Typha* spp, 84  
*Ulex*, 60  
*Ulmus glabra*, 63  
*Ulmus procera*, 63  
*Umbilicus rupestris*, 78  
upright brome, 43  
upright brome, 37  
upright hedge-parsley, 62  
*Vaccinium myrtillus*, 72  
*Valerianella locusta*, 77  
vectors, 19  
vegetable patch, 17  
*Verbascum thapsus*, 36  
*Verbena*, 49  
*Veronica beccabunga*, 83  
*Veronica chamaedrys*, 62, 70  
*Veronica* sect. *Pseudoveronica*, 58  
*Viburnum bodnantense*, 8  
*Viburnum carlesii*, 52  
*Viburnum opulus*, 59, 63  
*Viburnum tinus*, 59  
*Viburnum x bodnantense*, 59  
*Viburnum x burkwoodii*, 59  
*Vicia sylvatica*, 62, 70  
vine weevil, 19  
*Viola odorata*, 52, 70

## *In Horto Feritas*

- Viola riviniana*, 41, 62, 70, 75  
*Viola* spp, 78  
violets, 49  
virgin's bower, 52  
Virginia creeper, 8, 27  
Virginian stock, 28  
voles, 39  
voucher specimens, 17  
wall germander, 37  
wall lettuce, 75  
wall scalewort, 74  
wall screw-moss, 76  
wall shrubs, 26  
wallflowers, 51  
wall-rue, 73, 76  
wasps, 11, 19, 24, 54  
water crow-foot, 83  
water features, 80  
water forget-me-not, 83  
water garden, 84  
water-lilies, 9  
water mint, 83  
water plantain, 82  
water poppy, 84  
water soldier, 81  
water-cress, 83  
water-lilies, 85  
wavy bitter-cress, 34  
wavy hair-grass, 37  
wayfaring-tree, 63  
weasels, 39  
*Weigela* 'Briant Rubidor', 59  
*Weissia controversa*, 74  
white clover, 43  
white dead-nettle, 70  
white earwort, 72  
white stonecrop, 37  
white stork, 26  
white water-lily, 84  
whitefly, 33, 53  
wild carrot, 37, 75  
wild cherry, 63  
wild daffodil, 70  
wild mignonette, 37  
wild orchids, 44  
wild pear, 63  
wild plum, 9, 63  
wild privet, 62  
wild service-tree, 63  
wild thyme, 37, 44, 74  
window boxes, 27  
winter aconites, 51, 78  
winter-sweet, 52  
wireworms, 53  
*Wisteria*, 52  
wisterias, 27  
wood anemone, 62, 70  
wood avens, 70  
wood barley, 70  
wood crane's-bill, 70  
wood melick, 70  
wood millet, 70  
wood sage, 75  
wood small-reed, 70  
wood spurge, 62, 70  
wood vetch, 62, 70  
woodland edge, 59, 60, 61  
woodland edge habitat, 59  
woodlice, 10, 24, 79  
woodruff, 62, 70  
wood-sedge, 70  
wood-sorrel, 62, 70, 72, 75  
woolly fringe-moss, 72  
wren, 27  
wych elm, 63  
*Xanthoria parietina*, 78  
yarrow, 37, 40, 41, 43, 77  
yellow alison, 37  
yellow archangel, 62, 70  
yellow chamomile, 37  
yellow iris, 83  
yellow oat-grass, 9, 37, 42  
yellow rattle, 9, 43  
yellow water-lily, 83  
yellow whitlowgrass, 76  
yew, 9, 61, 63  
Yorkshire-fog, 9, 37, 42  
*Zinnia*, 49