

The wild vascular plants of Glasgow Botanic Gardens, Scotland

M. Philip

Willow Cottage, 3 Marlage, Larkhall, Lanarkshire ML9 3DJ

E-mail: botany@opus44.co.uk

ABSTRACT

This paper presents the results of a survey of the wild vascular plants of Glasgow Botanic Gardens, Scotland conducted between 2017 and 2019, and a comparison of these with P. Macpherson's list published in 1998. A total of 308 taxa were recorded in the Gardens in 2017-19. Of these, 181 (58%) were reported in 1998 and 127 (42%) are additions. In the 2017-19 survey, 95 taxa (34% of those listed in 1998) were not refound. Notes are provided on some of the previously unrecorded species and the rate of species turnover in the Gardens is discussed.

INTRODUCTION

In 2017 it was suggested to the author that the article and catalogue of the wild plants of Glasgow Botanic Gardens, Scotland (GBG) compiled in 1998 by my predecessor as BSBI Recorder for VC77, the late Peter Macpherson (PM) (Macpherson, 1998), could be revisited and a comparative study undertaken to ascertain what may have changed over the intervening 20 years. In view of the broader task of gathering data for the Botanical Society of Britain and Ireland (BSBI) Atlas 2020 (BSBI, 2023), I chose to place a fresh study of Glasgow Botanic Gardens in that context and gather data across 2017, 2018 and 2019 rather than confine the effort solely to 2018. It should be remembered that PM's 1998 list was also a compilation of visits carried out from 1994 to 1997 (i.e. a comparable spread of time). As far as practicable, a similar methodology was followed: recording was of all plants considered growing "as wild" at the site where they were found, including natives and aliens that had arrived by natural dispersal or accidental introduction, or had spread from their original planting location in GBG (Macpherson, 1998; Macpherson *et al.*, 1996).

RESULTS

A complete list of plants recorded in 1994-97 and in 2017-19 is provided in Appendix 1. Species names of all plants added to the list in 2019 follow Stace (2019). Changes in PM's 1998 nomenclature are shown in Appendix 2. Also indicated in Appendix 1 is each plant's inferred status in GBG. Following Macpherson (1998), in cases where the status is uncertain, plants have been assigned to what is considered to be the most likely category to avoid including an additional "doubtful" category.

PM's 1998 list of plant species within GBG includes 276

taxa. Taking all 2017-19 records into account, 308 taxa have been recorded. Of these, 181 were noted in 1994-97 (58%) and 127 (42%) are additions. The 2017-19 survey did not refind 95 taxa (34%) listed in 1998. Fig. 1 summarises the changes that occurred between the two surveys.

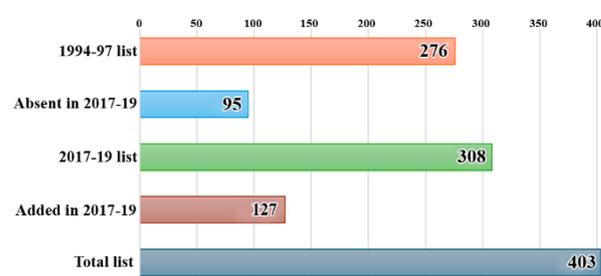


Fig. 1. Comparison of the numbers of vascular plant species recorded in Glasgow Botanic Gardens in 1994-97 and 2017-19.

It will thus be seen that the total number of species recorded growing "as wild" in GBG in 2017-19 is broadly similar to the number recorded in 1994-97. Further, the number of these species unique to their respective date class is also similar (something over one third).

DISCUSSION

The main observation derived following the 2017-19 survey is that much had changed over a 20-year period. Even allowing for outliers, one-off opportunist aliens, and the impossibility of replicating PM's survey exactly both across the ground and across the seasons, it is clear that a significant proportion of the plants recorded in 1994-97 were no longer to be found in GBG in 2017-19 and that their place had been taken by species not noted on the site previously.

Plant species still present in 2017-19

The statistics are, almost inevitably, misleading. For example, PM identified three different daffodil species in 1994-97: the 2017-19 survey made no attempt to repeat that. Other difficult genera such as *Taraxacum* (dandelion), *Salix* (willow), *Sorbus* (whitebeam), and *Rubus* (bramble) were certainly grappled with (with varying degrees of success) but efforts to identify every representative were neither exhaustive nor systematic. The same can be said of some of the grasses and the celebrated examples of *Cotoneaster* species in the "old

railway station" enclosure: it cannot be stated with certainty that all such species from the 1998 list have been accounted for – some of them had probably continued to survive, while others noted as "new" in the later survey may well have been present 20 years before.

The two lists probably overlap more than the above statistics suggest. What is beyond dispute is that many species that were present in GBG in 1994-97 were still to be found in 2017-19. A number of these are plants of semi-natural habitats, usually native, found in the marginal habitats notably by the mostly wooded or alluvial banks of the Kelvin. However, many common urban garden weeds find opportunity at GBG (as in any garden!). The sample list below also includes a wide range of slightly less familiar garden and wayside weeds, a range of grasses and ferns, hedgerow species, and suckering shrubs and trees:

Acer platanoides (Norway maple)
Ajuga reptans (bugle)
Alopecurus geniculatus (marsh foxtail)
Asplenium scolopendrium (hart's-tongue)
Blechnum spicant (hard fern)
Bromopsis ramosa (hairy brome)
Buddleja davidii (butterfly-bush)
Calystegia sepium (hedge bindweed)
Carex sylvatica (wood sedge)
Chrysosplenium oppositifolium (opposite-leaved golden-saxifrage)
Cymbalaria muralis (ivy-leaved toadflax)
Cynosurus cristatus (crested dog's-tail)
Epilobium ciliatum (American willowherb)
Eupatorium cannabinum (hemp-agrimony)
Ficaria verna (lesser celandine)
Geranium pyrenaicum (hedgerow crane's-bill)
Gnaphalium uliginosum (marsh cudweed)
Heracleum mantegazzianum (giant hogweed)
Impatiens glandulifera (Himalayan balsam)
Leucanthemum vulgare (ox-eye daisy)
Luzula campestris (field wood-rush)
Mercurialis perennis (dog's-mercury)
Pilosella aurantiaca ssp. *carpathicola* (fox-and-cubs)
Ribes uva-crispa (gooseberry)
Rubus cockburnianus (white-stemmed bramble)
Scrophularia nodosa (common figwort)
Soleirolia soleirolii (mind-your-own-business)
Spergula arvensis (corn spurrey)
Taxus baccata (yew)
Tellima grandiflora (fringe-cups)
Valeriana officinalis (common valerian)
Veronica officinalis (heath speedwell)

Among the more elusive denizens of GBG are:

Acaena ovalifolia (two-spined acaena)
Collomia linearis (tiny trumpet)
Epipactis helleborine (broad-leaved helleborine – locally known as "the Glasgow orchid")
Hypericum x desetangii (Des Etang's St. John's-wort)
Impatiens parviflora (small balsam)
Lathraea clandestina (purple toothwort)
Linaria amethystea ssp. *multipunctata* (a small spotted toadflax with no common name)

Mycelis muralis (wall lettuce)
Reynoutria x bohemica (Bohemian knotweed)
Stachys arvensis (field woundwort) (Fig. 2)
Tanacetum macrophyllum (rayed tansy)

All the species listed above are among those which can be considered well-established on the site: in other words, they would appear to be "here to stay".



Fig. 2. *Stachys arvensis* (field woundwort) in Glasgow Botanic Gardens. (Photo: M. Philip)

Plant species not refound in 2017-19

It is never easy to bid old friends goodbye, but the great wheel of nature turns inexorably and the frantic competition for suitable places inevitably results in losers as well as winners. In our efforts to prioritise conservation, it is always worth bearing in mind the extreme brevity of human life, and the fact that we can too easily consider the "status quo" is that which is merely a random snapshot on a very long time-line. Although we may regret losing species from GBG, their ranks did contain many plants which were escapees, opportunists, thugs and chancers in the first place! Perhaps of some concern to conservationists are the apparent losses of some native species in the list below.

Species not refound in 2017-19 include:

Allium giganteum (giant onion)
Alstroemeria aurea (Peruvian lily)
Apium graveolens (wild celery)
Bellis perennis (cultivar "pom-pom daisy")
Campanula rapunculoides (creeping bellflower)
Chaerophyllum hirsutum (hairy chervil)
Cicerbita macrophylla (blue sow-thistle)
Dactylorhiza maculata (heath spotted-orchid)
Epilobium komarovianum (bronzy willowherb)
Epilobium roseum (pale willowherb)
Erythranthe x robertsii (hybrid monkey-flower)
Galium saxatile (heath bedstraw)
Hesperis matronalis (dame's violet)
Lamium maculatum (spotted dead-nettle)
Lathyrus pratensis (meadow vetchling)
Lunaria annua (honesty)
Matricaria chamomilla (scented mayweed)
Papaver somniferum (opium poppy)
Petrosedum rupestre (reflexed stonecrop)
Potentilla erecta (tormentil)

Saxifraga rotundifolia (round-leaved saxifrage)
Sonchus arvensis (perennial sow-thistle)
Stellaria nemorum (wood stitchwort)
Teucrium scorodonia (wood sage)
Tragopogon pratensis ssp. *minor* (goat's-beard)
Veronica agrestis (green field-speedwell)
The author would welcome new reports of any of these species found in GBG.

Previously unrecorded plant species

The most exciting part of carrying out such a survey is finding species that have not been recorded on the site before. In the case of GBG, some were, in all probability, overlooked in the past. There are a dozen or so very common plants that were not recorded in 1998: for instance, it seems unlikely that grasses such as *Agrostis stolonifera* (creeping bent), *Dactylis glomerata* (cock's-foot), *Holcus lanatus* (Yorkshire-fog) and *Lolium perenne* (perennial rye-grass), or herbs such as *Cirsium arvense* (creeping thistle), and *Plantago lanceolata* (ribwort plantain) were not on the 1998 list. Significant finds in the genera *Carex* (sedges), *Equisetum* (horsetails), *Geranium* (crane's-bills) and *Veronica* (speedwells) expanded the 2017-19 list. It is also possible that a number of aquatic plants appeared after 1998 times during reconstruction of the pond around 2004. Below are notes on some species not recorded in the Gardens before 2017-19.

Allium carinatum (keeled garlic) may have been new to GBG, but it is familiar in the Clyde Valley, for example on the riverbanks around Blantyre.

Asarina procumbens (trailing snapdragon) had been around for some time (Fig. 3), although initial rumours that this plant was introduced to GBG in the 1970s have been dismissed by the staff. Coincidentally, this species had also been recorded around the time of the 2017-19 survey on a wall in Larkhall, South Lanarkshire.

Cardamine amara (large bittercress) turned up on the water's edge on the River Kelvin. The dark anthers and large terminal lobe on the leaves make it unmistakable.

Chelidonium majus (greater celandine) appeared as a weed behind one of the buildings.

Cymbalaria hepaticifolia (Corsican toadflax) was established as a shy weed in a shrubbery. It is similar in appearance to the more familiar *Cymbalaria muralis* (ivy-leaved toadflax), but has white flowers.

Four *Equisetum* species were recorded in 2017-19 (there being none in PM's 1998 account). They are *E. arvense* (field horsetail), *E. fluviatile* (water horsetail), *E. palustre* (marsh horsetail), and *E. sylvaticum* (wood horsetail).

Glechoma hederacea (ground-ivy) may have been previously overlooked, but was recorded in both 2017 and 2018.

Hieracium dumosum (yellow-glandular hawkweed) was



Fig. 3. *Asarina procumbens* (trailing snapdragon) thriving on a sheltered brick wall, Glasgow Botanic Gardens. (Photo: M. Philip)

found on top of a wall and a specimen was sent to the referee for identification. Apparently, the GBG staff had been aware of it for many years. The herbarium specimen has been preserved by Glasgow Museums.

Juncus tenuis (slender rush) is frequent in rural Lanarkshire, especially on wet, trampled ground such as waterlogged paths.

Parietaria judaica (pellitory-of-the-wall) appeared as an occasional weed in the margin of the Herb Garden (Fig. 4). A procession of all sorts of annual weeds has probably been going on here largely unnoticed, except by the occasional field botanist.

Polystichum aculeatum (hard shield-fern) was frequent on the steep ground near the path above the River Kelvin.

Stellaria alsine (bog stitchwort) is another small and easily-overlooked plant of wet ground.

Verbascum virgatum (twiggy mullein) is another "weed" recorded in the cultivated Herb Garden area.

CONCLUSION

It is clear that the wild flora of GBG is an indication of a highly dynamic environment in which change appears to be extensive and rapid. Comparing the species totals of the 1994-97 and 2017-19 lists suggests that, on average, 1.0-1.5% of botanical species diversity was lost and replaced per year in GBG over 20 years. Given a



Fig. 4. *Parietaria judaica* (pellitory-of-the-wall), an opportunist weed in the Herb Garden, Glasgow Botanic Gardens. (Photo: M. Philip)

typical survey total of around 300 species, this “species churn” rate of over three species per year matches well with our figures. No doubt, should a similar project be carried out after another interval of 20 years, a further gradual shift in the inventory of wild plants at GBG will have occurred. It is likely that up to a third of the 2017-19 catalogue will have, by then, been supplanted by new arrivals. Recent observations at other sites suggest that such a “churn” rate may be typical - something that would merit further study and research.

ACKNOWLEDGEMENTS

Thanks are due to the helpful staff at Glasgow Botanic Gardens, to the RSPB for invitations to participate in "Bioblitz" activities, to Keith Watson at Glasgow Museums, and especially to all the keen, sharp-eyed amateur field botanists who were part of the 2017-19 survey work. One of these deserves particular mention: Malcolm Macneill's frequent visits and revisits, chatting to gardeners, hunting almost forensically for tiny plants, and following up to check on identifications, added significantly to the breadth of the record.

EDITOR'S NOTE

The first version of the manuscript of this paper was received by the Editor on 12th May 2020. After the manuscript underwent external peer review in July 2020, the subsequent stages of the publication process were interrupted by a number of circumstances, some related to the COVID-19 pandemic of 2020-23. I am indebted to Keith Watson for his major input into the final editing of the paper.

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APPENDIX 1

Alphabetical list of plants recorded in GBG in the 1994-97 survey of MacPherson (1998) and 2017-19 survey of the present author. The nomenclature complies with Stace (2019). Changes in the nomenclature used by Macpherson (1998) are shown in Appendix 2. Key: ■ native on site; ■ alien, naturally dispersed to site; ■ alien, accidentally introduced to site; ■ planted elsewhere in GBG but spread to site; □ not recorded.

Species	1994-97	2017-19
<i>Acaena novae zelandiae</i>		
<i>Acaena ovalifolia</i>		
<i>Acer platanoides</i>		
<i>Acer pseudoplatanus</i>		
<i>Achillea millefolium</i>		
<i>Adiantum capillus-veneris</i>		
<i>Aegopodium podagraria</i>		
<i>Aesculus hippocastanum</i>		
<i>Agrostis canina</i>		
<i>Agrostis capillaris</i>		
<i>Agrostis stolonifera</i>		
<i>Ajuga reptans</i>		
<i>Alchemilla mollis</i>		
<i>Alchemilla xanthochlora</i>		
<i>Alliaria petiolata</i>		
<i>Allium carinatum</i>		
<i>Allium giganteum</i>		
<i>Allium paradoxum</i>		
<i>Allium ursinum</i>		
<i>Alnus glutinosa</i>		
<i>Alopecurus geniculatus</i>		
<i>Alopecurus pratensis</i>		
<i>Alstroemeria aurea</i>		
<i>Ammi majus</i>		
<i>Anisantha sterilis</i>		
<i>Anthriscus sylvestris</i>		
<i>Aphanes arvensis</i> agg.		
<i>Apium graveolens</i>		
<i>Aquilegia vulgaris</i>		
<i>Arabidopsis thaliana</i>		
<i>Arctium lappa</i>		
<i>Arctium minus</i>		
<i>Artemisia vulgaris</i>		
<i>Aruncus dioicus</i>		
<i>Asarina procumbens</i>		
<i>Asplenium adiantum-nigrum</i>		
<i>Asplenium ruta-muraria</i>		
<i>Asplenium scolopendrium</i>		
<i>Asplenium trichomanes</i>		
<i>Athyrium filix-femina</i>		
<i>Aucuba japonica</i>		
<i>Avenella flexuosa</i>		
<i>Barbarea vulgaris</i>		
<i>Bellis perennis</i>		
<i>Bellis perennis</i> (cultivar)		
<i>Betula pendula</i>		

Species	1994-97	2017-19
<i>Betula pubescens</i>		
<i>Bistorta officinalis</i>		
<i>Blechnum spicant</i>		
<i>Brassica napus</i>		
<i>Brassica rapa</i>		
<i>Briza maxima</i>		
<i>Bromopsis ramosa</i>		
<i>Buddleja davidii</i>		
<i>Callitriche stagnalis</i>		
<i>Caltha palustris</i>		
<i>Calystegia sepium</i>		
<i>Campanula latifolia</i>		
<i>Campanula rapunculoides</i>		
<i>Campanula trachelium</i>		
<i>Capsella bursa-pastoris</i>		
<i>Cardamine amara</i>		
<i>Cardamine flexuosa</i>		
<i>Cardamine hirsuta</i>		
<i>Cardamine pratensis</i>		
<i>Carex nigra</i>		
<i>Carex pendula</i>		
<i>Carex remota</i>		
<i>Carex rostrata</i>		
<i>Carex sylvatica</i>		
<i>Castanea sativa</i>		
<i>Centaurea montana</i>		
<i>Centaurea nigra</i>		
<i>Cerastium fontanum</i>		
<i>Cerastium glomeratum</i>		
<i>Chaerophyllum hirsutum</i>		
<i>Chamaenerion angustifolium</i>		
<i>Chelidonium majus</i>		
<i>Chenopodium album</i>		
<i>Chrysosplenium oppositifolium</i>		
<i>Cicerbita macrophylla</i>		
<i>Circaea lutetiana</i>		
<i>Circaea x intermedia</i>		
<i>Cirsium arvense</i>		
<i>Cirsium vulgare</i>		
<i>Claytonia perfoliata</i>		
<i>Claytonia sibirica</i>		
<i>Clematis vitalba</i>		
<i>Clinopodium vulgare</i>		
<i>Colchicum autumnale</i>		
<i>Collomia linearis</i>		
<i>Conopodium majus</i>		

Species	1994-97	2017-19
<i>Convallaria majalis</i>		
<i>Convolvulus arvensis</i>		
<i>Cotoneaster apiculatus</i>		
<i>Cotoneaster boisianus</i>		
<i>Cotoneaster bullatus</i>		
<i>Cotoneaster franchetii</i>		
<i>Cotoneaster frigidus</i>		
<i>Cotoneaster hjelmqvistii</i>		
<i>Cotoneaster horizontalis</i>		
<i>Cotoneaster lacteus</i>		
<i>Cotoneaster rehderi</i>		
<i>Cotoneaster salicifolius</i>		
<i>Cotoneaster simonsii</i>		
<i>Cotoneaster x watereri</i>		
<i>Crassula helmsii</i>		
<i>Crataegus monogyna</i>		
<i>Crocoshmia x crocosmiiflora</i>		
<i>Cymbalaria hepaticifolia</i>		
<i>Cymbalaria muralis</i>		
<i>Cynosurus cristatus</i>		
<i>Cytisus scoparius</i>		
<i>Dactylis glomerata</i>		
<i>Dactylorhiza maculata</i>		
<i>Dasiphora fruticosa</i>		
<i>Daucus carota ssp. carota</i>		
<i>Digitalis purpurea</i>		
<i>Dryopteris affinis agg.</i>		
<i>Dryopteris affinis ssp. cambrensis</i>		
<i>Dryopteris dilatata</i>		
<i>Dryopteris filix-mas</i>		
<i>Elaeagnus umbellata</i>		
<i>Eleocharis acicularis</i>		
<i>Eleocharis palustris</i>		
<i>Elymus repens</i>		
<i>Epilobium brunnescens</i>		
<i>Epilobium ciliatum</i>		
<i>Epilobium komarovianum</i>		
<i>Epilobium montanum</i>		
<i>Epilobium obscurum</i>		
<i>Epilobium roseum</i>		
<i>Epipactis helleborine</i>		
<i>Equisetum arvense</i>		
<i>Equisetum fluviatile</i>		
<i>Equisetum palustre</i>		
<i>Equisetum sylvaticum</i>		
<i>Erodium cicutarium</i>		
<i>Erophila verna s.s.</i>		
<i>Erythranthe x robertsii</i>		
<i>Eupatorium cannabinum</i>		
<i>Euphorbia amygdaloides ssp. robbiae</i>		
<i>Euphorbia peplus</i>		
<i>Fagus sylvatica</i>		
<i>Festuca rubra agg.</i>		
<i>Ficaria verna</i>		

Species	1994-97	2017-19
<i>Filipendula ulmaria</i>		
<i>Foeniculum vulgare</i>		
<i>Fragaria ananassa</i>		
<i>Fragaria vesca</i>		
<i>Frangula alnus</i>		
<i>Fraxinus excelsior</i>		
<i>Galeopsis tetrahit</i>		
<i>Galium aparine</i>		
<i>Galium saxatile</i>		
<i>Geranium lucidum</i>		
<i>Geranium pratense</i>		
<i>Geranium pyrenaicum</i>		
<i>Geranium robertianum</i>		
<i>Geranium sylvaticum</i>		
<i>Geum urbanum</i>		
<i>Gilia inconspicua</i>		
<i>Glechoma hederacea</i>		
<i>Glyceria maxima</i>		
<i>Gnaphalium uliginosum</i>		
<i>Hedera colchica</i>		
<i>Hedera helix</i>		
<i>Hedera hibernica 'Hibernica'</i>		
<i>Heracleum mantegazzianum</i>		
<i>Heracleum sphondylium</i>		
<i>Hesperis matronalis</i>		
<i>Hieracium agg.</i>		
<i>Hieracium dumosum</i>		
<i>Hieracium sabaudum</i>		
<i>Hieracium triviale</i>		
<i>Hieracium virgultorum</i>		
<i>Holcus lanatus</i>		
<i>Holcus mollis</i>		
<i>Hyacinthoides hispanica</i>		
<i>Hyacinthoides non-scripta</i>		
<i>Hyacinthoides x massartiana</i>		
<i>Hydrocharis morsus-ranae</i>		
<i>Hypericum androsaemum</i>		
<i>Hypericum perforatum</i>		
<i>Hypericum tetrapterum</i>		
<i>Hypericum x desetangsii</i>		
<i>Hypochaeris radicata</i>		
<i>Ilex aquifolium</i>		
<i>Ilex x altaclerensis</i>		
<i>Impatiens glandulifera</i>		
<i>Impatiens parviflora</i>		
<i>Iris pseudacorus</i>		
<i>Jacobaea aquatica</i>		
<i>Jacobaea vulgaris</i>		
<i>Juncus articulatus</i>		
<i>Juncus bufonius</i>		
<i>Juncus effusus</i>		
<i>Juncus tenuis</i>		
<i>Knautia dipsacifolia</i>		
<i>Laburnum alpinum</i>		

Species	1994-97	2017-19
<i>Lactuca serriola</i> f. <i>integrifolia</i>		
<i>Lamiastrum galeobdolon</i> ssp. <i>argentatum</i>		
<i>Lamium maculatum</i>		
<i>Lamium purpureum</i>		
<i>Lapsana communis</i>		
<i>Larix decidua</i>		
<i>Lathraea clandestina</i>		
<i>Lathyrus pratensis</i>		
<i>Lemna minor</i>		
<i>Lemna trisulca</i>		
<i>Lepidium didymum</i>		
<i>Leucanthemum vulgare</i>		
<i>Ligustrum ovalifolium</i>		
<i>Limnanthes douglasii</i>		
<i>Linaria amethystea</i> ssp. <i>multipunctata</i>		
<i>Linaria repens</i>		
<i>Linaria vulgaris</i>		
<i>Lolium perenne</i>		
<i>Lonicera involucrata</i>		
<i>Lonicera periclymenum</i>		
<i>Lotus corniculatus</i>		
<i>Lotus pedunculatus</i>		
<i>Lunaria annua</i>		
<i>Luzula campestris</i>		
<i>Luzula multiflora</i>		
<i>Luzula sylvatica</i>		
<i>Lysimachia punctata</i>		
<i>Matricaria chamomilla</i>		
<i>Matricaria discoidea</i>		
<i>Medicago lupulina</i>		
Melastomaceae sp.		
<i>Melica uniflora</i>		
<i>Mentha aquatica</i>		
<i>Menyanthes trifoliata</i>		
<i>Mercurialis perennis</i>		
<i>Montia fontana</i>		
<i>Mycelis muralis</i>		
<i>Myosotis arvensis</i>		
<i>Myosotis scorpioides</i>		
<i>Myosotis sylvatica</i>		
<i>Myrrhis odorata</i>		
<i>Narcissus</i> (Div. 1)		
<i>Narcissus</i> (Div. 2)		
<i>Narcissus</i> (Div. 3)		
<i>Nepeta</i> cf. <i>racemosa</i>		
<i>Oenothera</i> agg.		
<i>Oxalis corniculata</i>		
<i>Oxalis corniculata</i> var. <i>atropurpurea</i>		
<i>Oxalis triangularis</i>		
<i>Papaver cambricum</i>		
<i>Papaver dubium</i> s.l.		
<i>Papaver rhoeas</i>		
<i>Papaver somniferum</i>		
<i>Parietaria judaica</i>		

Species	1994-97	2017-19
<i>Persicaria maculosa</i>		
<i>Petrosedum rupestre</i>		
<i>Phalaris arundinacea</i>		
<i>Phleum pratense</i>		
<i>Picea sitchensis</i>		
<i>Pilosella aurantiaca</i> ssp. <i>carpathicola</i>		
<i>Pilosella officinarum</i>		
<i>Plantago lanceolata</i>		
<i>Plantago major</i>		
<i>Poa annua</i>		
<i>Poa nemoralis</i>		
<i>Poa pratensis</i>		
<i>Poa trivialis</i>		
<i>Polygonatum</i> x <i>hybridum</i>		
<i>Polygonum arenastrum</i>		
<i>Polygonum aviculare</i>		
<i>Polypodium vulgare</i> s.l.		
<i>Polystichum aculeatum</i>		
<i>Polystichum setiferum</i>		
<i>Populus alba</i>		
<i>Populus tremula</i>		
<i>Potamogeton natans</i>		
<i>Potentilla anserina</i>		
<i>Potentilla erecta</i>		
<i>Primula japonica</i>		
<i>Primula vulgaris</i>		
<i>Prunella vulgaris</i>		
<i>Prunus lusitanica</i>		
<i>Prunus padus</i>		
<i>Pteridium aquilinum</i>		
<i>Quercus cerris</i>		
<i>Quercus petraea</i>		
<i>Quercus robur</i>		
<i>Quercus</i> sp.		
<i>Quercus</i> x (<i>rosacea</i>)		
<i>Ranunculus acris</i>		
<i>Ranunculus repens</i>		
<i>Reynoutria japonica</i>		
<i>Reynoutria sachalinensis</i>		
<i>Reynoutria</i> x <i>bohemica</i>		
<i>Rhododendron ponticum</i>		
<i>Ribes nigrum</i>		
<i>Ribes rubrum</i>		
<i>Ribes sanguineum</i>		
<i>Ribes uva-crispa</i>		
<i>Rosa canina</i> agg.		
<i>Rosa rugosa</i>		
<i>Rubus cockburnianus</i>		
<i>Rubus dasyphyllus</i>		
<i>Rubus fruticosus</i> agg.		
<i>Rubus idaeus</i>		
<i>Rubus laciniatus</i>		
<i>Rubus latifolius</i>		
<i>Rubus leptothyrsos</i>		

Species	1994-97	2017-19
<i>Rubus parviflorus</i>		
<i>Rubus radula</i>		
<i>Rubus spectabilis</i>		
<i>Rumex acetosa</i>		
<i>Rumex acetosella</i>		
<i>Rumex longifolius</i>		
<i>Rumex obtusifolius</i>		
<i>Rumex sanguineus</i>		
<i>Sagina apetala</i>		
<i>Sagina procumbens</i>		
<i>Salix alba</i>		
<i>Salix caprea</i>		
<i>Salix caprea</i> x <i>cinerea</i>		
<i>Salix cinerea</i> ssp. <i>oleifolia</i>		
<i>Sambucus nigra</i>		
<i>Sanicula europaea</i>		
<i>Saxifraga rotundifolia</i>		
<i>Saxifraga</i> x <i>urbium</i>		
<i>Schedonorus giganteus</i>		
<i>Schedonorus pratensis</i>		
<i>Scilla forbesii</i>		
<i>Scirpus sylvaticus</i>		
<i>Scorzonera hispanica</i>		
<i>Scrophularia nodosa</i>		
<i>Senecio sylvaticus</i>		
<i>Senecio vulgaris</i>		
<i>Sida hermaphrodita</i>		
<i>Silene dioica</i>		
<i>Silybum marianum</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Solanum lycopersicum</i>		
<i>Solanum tuberosum</i>		
<i>Soleirolia soleirolii</i>		
<i>Sonchus arvensis</i>		
<i>Sonchus asper</i>		
<i>Sonchus oleraceus</i>		
<i>Sorbus aria</i>		
<i>Sorbus aucuparia</i>		
<i>Sorbus intermedia</i>		
<i>Sorbus latifolia</i>		
<i>Sparganium emersum</i>		
<i>Spergula arvensis</i>		
<i>Stachys arvensis</i>		
<i>Stachys palustris</i>		
<i>Stachys sylvatica</i>		
<i>Stellaria alsine</i>		
<i>Stellaria media</i>		

Species	1994-97	2017-19
<i>Stellaria nemorum</i>		
<i>Symphoricarpos albus</i>		
<i>Symphoricarpos</i> x <i>chenaultii</i>		
<i>Symphotrichum novi-belgii</i>		
<i>Symphytum officinale</i>		
<i>Symphytum tuberosum</i>		
<i>Symphytum</i> x <i>uplandicum</i>		
<i>Tanacetum macrophyllum</i>		
<i>Tanacetum parthenium</i>		
<i>Tanacetum vulgare</i>		
<i>Taraxacum</i> agg.		
<i>Taraxacum cordatum</i>		
<i>Taraxacum duplidentifrons</i>		
<i>Taraxacum exacutum</i>		
<i>Taxus baccata</i>		
<i>Tellima grandiflora</i>		
<i>Teucrium scorodonia</i>		
<i>Tilia</i> x <i>europaea</i>		
<i>Tolmiea menziesii</i>		
<i>Tragopogon pratensis</i> ssp. <i>minor</i>		
<i>Trifolium dubium</i>		
<i>Trifolium pratense</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Tussilago farfara</i>		
<i>Typha latifolia</i>		
<i>Ulex europaeus</i>		
<i>Ulmus glabra</i>		
<i>Urtica dioica</i>		
<i>Valeriana officinalis</i>		
<i>Verbascum thapsus</i>		
<i>Verbascum virgatum</i>		
<i>Veronica agrestis</i>		
<i>Veronica arvensis</i>		
<i>Veronica chamaedrys</i>		
<i>Veronica hederifolia</i>		
<i>Veronica officinalis</i>		
<i>Veronica peregrina</i>		
<i>Veronica persica</i>		
<i>Veronica serpyllifolia</i>		
<i>Viburnum opulus</i>		
<i>Vicia sativa</i> ssp. <i>nigra</i>		
<i>Vicia sativa</i> ssp. <i>segetalis</i>		
<i>Vicia sepium</i>		
<i>Vinca minor</i>		
<i>Viola</i> (cultivar)		
<i>Viola riviniana</i>		
Total	276	308

APPENDIX 2

Changes in the nomenclature used by Macpherson (1998).

Macpherson (1998)	Stace (2019)
<i>Aster novi-belgii</i>	<i>Symphotrichum novi-belgii</i>
<i>Chamerion angustifolium</i>	<i>Chamaenerion angustifolium</i>
<i>Chionodoxa forbesii</i>	<i>Scilla forbesii</i>
<i>Deschampsia flexuosa</i>	<i>Avenella flexuosa</i>
<i>Elytrigia repens</i>	<i>Elymus repens</i>
<i>Fallopia japonica</i>	<i>Reynoutria japonica</i>
<i>Fallopia sachalinensis</i>	<i>Reynoutria sachalinensis</i>
<i>Fallopia x bohemica</i>	<i>Reynoutria x bohemica</i>
<i>Festuca gigantea</i>	<i>Schedonorus giganteus</i>
<i>Festuca pratensis</i>	<i>Schedonorus pratensis</i>
<i>Fragaria x ananassa</i>	<i>Fragaria ananassa</i>
<i>Hedera x 'Hibernica'</i>	<i>Hedera hibernica</i> 'Hibernica'
<i>Hieracium pseudorigens</i>	<i>Hieracium virgultorum</i>
<i>Hieracium vulgatum</i>	<i>Hieracium triviale</i>
<i>Lycopersicon esculentum</i>	<i>Solanum lycopersicum</i>
<i>Matricaria recutita</i>	<i>Matricaria chamomilla</i>
<i>Meconopsis cambrica</i>	<i>Papaver cambricum</i>
<i>Mimulus x robertsii</i>	<i>Erythranthe x robertsii</i>
<i>Persicaria bistorta</i>	<i>Bistorta officinalis</i>
<i>Phyllitis scolopendrium</i>	<i>Asplenium scolopendrium</i>
<i>Ranunculus verna</i>	<i>Ficaria verna</i>
<i>Sedum rupestre</i>	<i>Petrosedum rupestre</i>
<i>Senecio jacobaea</i>	<i>Jacobaea vulgaris</i>