THE FLORA OF DITCHAM PARK, HAMPSHIRE

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An ecological investigation of the vegetation of the estate of Ditcham Park was commenced in 1912 and continued till 1920, with the inevitable interruption during the years of the war. Some of the results of this investigation have already been published, and others are in the Press,[1] but as the estate has now been broken up and is hence liable to considerable alteration, it seems worth placing on record a few notes on the flora as it was during the period of investigation, even though it causes a certain amount of repetition of the accounts already published. The present very short description of the area and its flora is based on an ecological classification of the vegetation.

The Ditcham Park estate (as it was before its breaking up in 1921-22) lies about five miles south of Petersfield; it is mainly in Hampshire, but its eastern fringe is in Sussex. It forms a somewhat elongated piece of land, extending about three miles in the north and south direction, and rather over a mile east and west at the widest point. The long axis is parallel with the direct Portsmouth line of the London and South Western Railway, south of the village of Buriton.

The estate occupies a segment of the northern portion of the chalk outcrop, the part actually studied being bounded on the north by the foot of the escarpment of the Lower Chalk.

This escarpment, which faces almost due north, rises from the plain at an altitude of 300 feet, very steeply for 100-150 feet, and then more gradually to a maximum height of 660 feet. The Downs to the east and west rise to greater heights. In the southerly direction the land falls much more gently to a level of between 200-300 feet. The main north and south ridge of the estate is flanked by valleys on either side. That on the west, up which the railway runs, has a steep escarpment-like slope, rising 100-150 feet from the bottom. The eastern valley is neither so deep nor so steep-sided.

The rock underlying the whole area is chalk, which comes to the surface on the escarpment and on steep valley sides. On the summit plateau, however, and on the more gentle dip slopes, and especially towards the base of the dip slope, and in small valleys in it, the surface soil is largely non-calcareous, and may reach a considerable thickness. The areas of this soil covering

[1] Studies of the Vegetation of the English Chalk:—

I. "The Woodlands of Ditcham Park, Hampshire." By R. S. Adamson. Journ. Ecol. ix, 114, 1922.

II. "Early Stages of Redevelopment of Woody Vegetation on Chalk Grassland." By A. G. Tansley. Id. x, 168, 1922.

III. "The Chalk Grasslands of the Hampshire-Sussex Border." By A. G. Tansley and R. S. Adamson. Id. xiii, 1925.

the chalk may be generally classed along with what is termed "clay with flints." This soil varies from a few inches to several feet in thickness, and in consistency from a clay or clay loam to much lighter, more friable marls or loams. In no part is it at all sandy. Measurements of the amount of calcium carbonate in the surface soil show very considerable variation. The soil contains in all cases a very large number of flints, which occur either in definite layers or irregularly scattered.

There is a complete absence of springs or places with permanently wet soil, a fact that is, of course, clearly reflected in the flora.

VEGETATION.—A very large proportion, about 50 per cent. of the area investigated, is covered by woodland. This makes a conspicuous feature in the landscape, as the adjacent grounds to the east and west are largely grass-covered, except for the steep escarpment slopes and the lower parts of the dip slopes. For the most part the woodland has the appearance of being in a quite natural or semi-natural condition. The isolated fragments that occur on neighbouring parts of the chalk ridge have exactly the same character.

The only part of the woodlands that have certainly been planted are those occupying the summit of the ridge, which occupy what was at one time arable land and consist of mixed coppice and conifers.

For the convenience of short description, the vegetation may be divided into three classes, namely, woodland, scrub and grassland.

WOODLAND.—There are three main types present, beech woods, oak woods, which are for the most part coppiced, and a type that may be conveniently termed calcicolous coppice.

Beech Woods.—These occupy most of the escarpment slopes and steep valley sides where the soil is chalk at the surface. Beech woods also extend to some extent on to the leached soil on the plateau, but are absent from the dip slope and from the valley bottoms.

Beech typically forms very pure woods; very few other trees occur in association with the dominant. Those that do so are very tall and thin stemmed, and evidently struggling against suppression by the shading of the beech: ash is the most common associated tree, but is rarely present as more than isolated individuals among the beeches. *Taxus* occurs frequently as an under tree, but in the pure beech woods is nowhere in large quantity.

Shrubs are numerous, but nowhere form a continuous layer. In most of the woods many can be found which have been killed by the lack of light, and considerable areas are quite free from shrubs. *Acer campestre* and *Sambucus nigra* seem most able to

withstand the diminution of light, and are generally the most abundant, but neither flowers inside the woods. A considerable number of seedlings, of both trees and shrubs, which apparently live for two or three years only, can be found in these woods. In one woodland dozens of plants of *Euonymus europaeus* of ages from one to three years were found, but no trace of a more mature shrub.

The floor of these woods is, to a large extent, bare; even the bryophytes occur mostly around the bases of the trees and not as a continuous carpet. Of the phanerogams, *Mercurialis perennis* and *Sanicula europaea* are the most abundant, the former forming pure sheets where the light intensity is not too low.

Wherever a break occurs in the canopy a rich flora appears, as may be gathered by reference to the list.

The beech woods contain a certain number of characteristic species, among which may be mentioned *Helleborus viridis*, which occurs at the base of the escarpment, *Polygonatum multiflorum*, and the saprophytes *Monotropa hypopitys* and *Neottia nidus-avis*.

The beech woods on the leached plateau soils, as would be expected, have a different flora. Shrubs are much less abundant, and in some cases quite absent. The ground flora is even more sparse than on the chalk slopes, owing to the very reduced light and to the very marked drought to which the surface layers of soil are exposed in the summer. The differences in the floras are perhaps best seen in the bryophytes and in the presence in these woods, but not on the chalk slopes, of such plants as *Catherinea undulata*, *Mnium hornum* and *Polytrichum formosum*.

A number of vascular plants, however, occur here which are absent from the chalk slopes, *e.g.*, *Luzula forsteri*, *Nephrodium dilatatum* and *Festuca gigantea*.

On the steep valley sides to the east of the main ridge, and to some extent also to the west, the beech woods have been modified and converted into woods with larch standards in coppice. This produces very decided changes in the flora, which comes to resemble so closely that of the calcicolous coppices that they will be considered along with those.

The following plants have been found in the beech woods, but not elsewhere in the neighbourhood :—

Chelidonium majus.
Chrysosplenium oppositifolium.
Helleborus viridis.
Lactuca muralis.
Melampyrum pratense.
Ophrys muscifera.
Scolopendrium vulgare.

Calcicolous Coppice.—This occurs only on chalk soils, occupying steep slopes like those occupied by the beech woods, but also occurring on more gentle slopes on the summit of ridges or near valley bottoms. It does not extend at all on to the deeper non-calcareous soils.

This calcicolous coppice may be simple coppice or it may have standards, in which case the trees are beech or ash, or less often birch, with isolated examples of other trees. The coppice is very varied in composition, consisting of all the shrubs which are associated with chalk soils; the most abundant are *Cornus sanguinea* and coppiced ash, one or both of which frequently becomes dominant. Hazel is never dominant, and is often scarce or even absent.

These coppices seem to replace original beech woods: as mentioned, they may have beech standards. Both these beech standard copses and simple coppices occupy exactly the same positions as beech woods, and often occur in alternation with them. On the north escarpment an alternation of beech wood and calcareous coppice occurs with no change of any kind in either soil or physiographic conditions. In such cases the coppice would appear to owe its existence to the felling of the beech and the exploitation of the shrubs as coppice (the shrubs increasing greatly on the admission of light), with possibly in some cases some planting to complete the cover.

The ground flora here, as in all coppices, shows very considerable variations with the change of conditions brought about by period cutting of the shrubs. But, even apart from this, the flora is more rich and varied than that of the beech woods: much more light is admitted here even in the shade phase (*i.e.*, when the coppice has grown up). In the shade phase the floor is occupied mainly by mosses with scattered phanerogams. The mosses often form a nearly continuous covering. As compared with the beech woods, there is a reduction in the numbers of epiphytic species and a smaller proportion of liverworts.

The dominant mosses are *Hylocomium triquetrum* and *Porotrichum alopecurum*.

The phanerogamic flora is very varied; most of the beech wood species occur and many others, and in the light phase a considerable number of chalk grassland plants find a suitable habitat.

Very few species have been found in these coppices which do not occur in some of the other vegetation types of the area. Among those which appear to be only in this type of woodland are *Ophioglossum vulgatum*, which is very local, and *Viola odorata*.

Oak Woods and Coppices.—These occur on the non-calcareous soils on the dip slopes, and occupy a considerable extent of ground in the southern part of the investigated area. The woods are

almost all in the condition of coppice with standards. The standards are often rather sparse, though in some cases they are more numerous. Oak is much the commonest standard, though several other trees occur, as beech, yew, birch and ash. The two last are often allowed to grow up as trees from one shoot, which is left when the coppice is felled. The oaks are often rather stunted and ill-developed, and their condition bears an obvious relation to the depth of the surface soil. Only in the deepest soils at the bottoms of the slopes are really well developed oak trees present.

The coppice is very varied, but nearly always contains a considerable proportion of hazel, which may be dominant. There is an absence of some species occurring more or less frequently in the calcareous coppice, as *Ligustrum vulgare*, *Rhamnus catharticus* and *Ulmus glabra* (*montana*).

These woods show every grade of transition from the calcicolous coppice, and, though the extremes are very strikingly different, no hard and fast division line can be drawn between them.

In parts a gradual transition occurs between the oak-hazel wood and beech wood on leached soil, in the form of mixed woods of beech and oak, with a considerable quantity of hazel in the shrub layer.

The ground flora of these woods is also very varied, passing from one almost identical with that of the calcicolous coppice to a typically non-calcareous flora with such species as *Holcus mollis* and *Scila nonscripta*. In general there is an absence of chalk grassland plants in the light phase and a frequent occurrence of such plants as *Digitalis purpurea* and *Rumex condylodes*. *Viola riviniana*, too, is much more abundant here than *Viola silvestris*. In such varied woods there is no general dominant in the ground layer: *Mercurialis perennis* is dominant over large portions where the soil is not very deep and *Pteridium aquilinum* in valley bottoms.

The bryophytes are different in many ways from those in the woods on the chalk. *Brachythecium rutabulum*, *Brachythecium salebrosum* and *Hypnum cupressiforme* being the most abundant. Especially on the deeper soils and in valleys hepatics are more numerous than on the chalk.

The light phase in these woods is marked by a rich and varied assemblage of species, a larger number of plants not occurring in the shade phase being present than is the case in the calcicolous coppice. Very often in the light phase the wood becomes temporarily overrun with such plants as *Epilobium spp.*, *Senecio jacobaea* and sometimes *Holcus lanatus*.

Taken as a whole, these woods have a more numerous flora than any other of the vegetation types, and, as a reference to the

list will show, contain a large number of species not noted elsewhere. Only a few of the more interesting need be mentioned here :—

Carex pallescens.
Hordeum sylvaticum.
Hypericum androsaemum.
Luzula silvatica.
Milium effusum.
Populus tremula.
Sedum telephium.

SCRUB.—Scrub, which may be roughly defined as an uncoppiced shrub vegetation, occurs both on chalk and on non-calcareous soil.

Chalk Scrub.—While not abundant on the area immediately investigated, this forms a very general feature on most of the chalk downs.

Scrub on the chalk falls into two categories, namely, that representing phases of the degeneration and breaking-up of a pre-existing woodland, and, secondly, what may be termed "progressive scrub," where woody plants are colonizing the ground and tending to form a wood. The first class, degeneration scrub, is much the more widely distributed.

DEGENERATION SCRUB.—Of this there are several good examples on the estate or on the downs immediately surrounding it. This type shows every gradation from a closed or almost closed woodland to grassland with scattered trees and bushes. The woody plants may cover relatively large continuous areas or be only in isolated spots, and consist either only of shrubs or of trees in addition.

Here, on a chalk slope, just over the Sussex border, there is a good area of scrub, which shows a gradual transition from beech wood to very open scrub. The transition zone is marked by a very large amount of *Taxus*, which locally forms almost pure stands.

Such scrub seems to be the direct result of grazing in unenclosed woodland. The trees die and are unable to regenerate, and those which are either poisonous, like *Taxus*, or able to withstand the grazing pressure, as *Crataegus* and *Prunus spinosa*, spread and increase in quantity. Rabbits may in many cases be a potent agency in wood degeneration. Such scrub has a very mixed flora; true woodland plants occur in the shade, and grassland plants in the open parts. A number of species characteristic of the open parts of woodlands are very abundant in such scrub, *e.g.*, *Clinopodium vulgare*, *Origanum vulgare*, and *Atropa belladonna*.

This scrub has yielded very few plants not found elsewhere in the investigated region. Among the few may be mentioned *Pulicaria dysenterica*.

PROGRESSIVE SCRUB.—Two good examples of this type of scrub occur, the one occurring on what was originally arable land and the other on an area of woodland that was cleared for larch planting, but never utilised. In the latter case a scrub of *Cornus sanguinea* and *Viburnum lantana* has occupied the ground, while on the arable land birch and ash are the most abundant plants.

In both these areas an extremely varied assemblage of herbs is found, consisting of annuals, plants of chalk grassland and plants of open spots in woodlands. The first shade plants that have appeared are *Euphorbia amygdaloides* and *Primula vulgaris*.

These scrub areas have yielded a few species not found in other types, such as *Echium vulgare*, *Erigeron acre* and *Scrophularia aquatica*.

Scrub on non-calcareous soil.—There are two areas that come under this heading. First, a small area of scrub at the S.W. corner of the estate at the bottom of a slope, which consists of groups of bushes of varying degrees of closeness situated in grassland. The bushes are *Crataegus* and *Prunus spinosa*, with some hazel and ash. In part the bushes form a close thicket with very little undergrowth, but in other parts the shrubs are separate and the ground vegetation is composed of grassland species.

The second one is more active. It occurs on deep soil near the top of the ridge. A few years ago the ground was open, consisting of grassland with some old oak trees. At the present time at one end a thicket of young oak trees has grown up, set very close and thick, and with an undergrowth of *Rubus* and bracken, so that it is difficult to penetrate.

These scrub areas now yield few peculiar plants. The only ones noted are *Cytisus scoparius* and *Hieracium boreale*.

GRASSLAND.

Chalk grassland occurs over considerable areas of the downs, partly on the estate and partly on adjoining areas. The general features of this grassland are too well known to need special mention here. A detailed study is being published elsewhere (Tansley and Adamson, *op. cit.*).

The chalk grassland has a rich flora, and, as reference to the list will show, has many species not found in the other types. The orchids are conspicuously few as compared with chalk grassland in the S.E. of England, especially the Kentish Downs.

Grassland also occurs on the non-calcareous soils, and shows transitions and decided affinities with chalk grassland, just as do the coppices. But some of the grassland has not only a non-calcareous soil, but one which exhibits a slight degree of acidity in the surface layers. This has yielded a number of additions to

the list of the flora; besides *Calluna vulgaris*, which does occur on chalk grassland, the following are noteworthy:—*Deschampia flexuosa, Pedicularis silvatica, Polygala serpyllacea* and *Sieglingia decumbens*.

In addition to these heathy plants this non-calcareous grassland has yielded: *Aira caryophyllea, Alchemilla vulgaris, Carex hirta, Carex pilulifera, Thymus ovatus* and *Ulex europaeus*. *Brachypodium pinnatum* occurs here on molehills.

A considerable amount of this grassland, where it abuts on woodland, is becoming overrun by bracken.

LIST OF THE FLORA.

In the list which follows, the plants are arranged alphabetically under genera, an arrangement that has the great advantage of ease of reference. The nomenclature is, as far as possible, in accordance with the international rules.

The occurrences of the plants in eight types of vegetation are given, namely:—

1. Beech woods.
2. Calcicolous coppice.
3. Oak woods and coppice on deep soil.
4. Chalk scrub.
5. Scrub on non-calcareous soil.
6. Chalk grassland.
7. Other grassland.
8. Plants of roadsides, paths and arable land.

The frequency symbols are those in common use.[1] The frequencies for the different types are very general, and are based on a consideration of all the examples that have been examined. As a result, the relative frequencies are necessarily very rough and largely depend on subjective judgment, but even this approximate information renders such a list more interesting and, it is hoped, more useful than would be the case were no attempt made to convey the frequency of occurrence of the various species.

In the last column (8) are contained those plants occurring as weeds of arable land or farmyards, along roadsides and paths, which have not been recorded elsewhere.

A small pond near the house, which had been allowed to run wild, provides the habitat for three plants not found elsewhere: *Carex remota, Lemna minor* and *Nasturtium officinale*.

As regards the bryophytes, the nomenclature follows Dixon and Jameson for mosses and MacVicar for liverworts. The lists are certainly incomplete, and especially is this the case for scrub and for non-calcareous grassland. There has been no attempt to make a complete list of bryophytes for column 8.

[1] va=very abundant, a=abundant, f=frequent, o=occasional, r=rare, l=local, d=dominant (ld=locally dominant, la=locally abundant, etc.).

	1 Beech Wood.	2 Calcicolous Coppice.	3 Oakwood and Coppice on deep soil.	4 Chalk Scrub.	5 Other Scrub.	6 Chalk Grassland.	7 Other Grassland.	8 Paths, Arable, etc.
Acer campestre	f	f–a	f	f–a				
Acer pseudoplatanus ...	r	o						
Aceras anthropophora ...						r		
Achillea millefolium ...				o	f	f–la	f–a	
Adoxa moschatellina ...	o		la					
Aegopodium podagraria								*
Aethusa cynapium ...			r					
Agrimonia eupatoria ...	o	o	o	o		o	o	
Agropyrum repens ...						r		
Agrostemma githago ...								*
Agrostis alba	o	o	o	o	f	f–la		
Agrostis tenuis (vulgaris)			o		f	o	f–a	
Aira caryophyllea ...							f	
Aira praecox								*
Ajuga reptans	f	f–a	f	f	f			
Alchemilla arvensis ...				o		r		
Alchemilla vulgaris ...							r	
Allium ursinum	la	la	la					
Alnus glutinosa ...				r				
Alopecurus pratensis ...								*
Anagallis arvensis ...	r	o	o	o		r	o	
Anemone nemorosa ...	f	f	f					
Angelica silvestris ...		o–f	o–f				o	
Anthemis arvensis ...			r					
Anthoxanthum odoratum		r	o	o	o	o–f	f	
Anthriscus silvestris ...			l					
Anthyllis vulneraria ...						la		
Antirrhinum majus ...								*
Aquilegia vulgaris ...	o	l	r					
Arabis hirsuta		o	o	o				
Arctium minus	o	o	o	o	o			
Arctium vulgare								*
Arenaria serpyllifolia ...			o	o–f	o	o		
Arenaria trinervia ...	o		o			r		
Arrhenatherum elatius ...		o	o	o	o	l		
Arum maculatum ...	o	lf	f	o				
Asperula cynanchica ...				o–f		a	f	
Asperula odorata ...	o	lf	l					
Atriplex patula								*
Atropa belladonna ...	r	l	o	f		l		
Avena pratensis				f		f–a	f	
Avena pubescens ...				f		f		
Ballota nigra								*
Barbarea vulgaris ...								*
Bartsia odontites ...		o	o		o			
Bellis perennis		o	o	o		o		
Betula alba		la	la–ld	o	f	r		
Betula pubescens ...		lf	lf	r	o–f			
Blackstonia perfoliata ...				o		o		
Brachypodium pinnatum							l	

	1 Beech Wood.	2 Calcicolous Coppice.	3 Oakwood and Coppice on deep soil.	4 Chalk Scrub.	5 Other Scrub.	6 Chalk Grassland.	7 Other Grassland.	8 Paths, Arable, etc.
Brachypodium silvaticum	o	la	f	f		l		
Brassica campestris ...								*
Briza media				f		f	f	
Bromus erectus ...						o		
Bromus mollis								*
Bromus ramosus ...	l	o–f	o					
Bromus sterilis								*
Bryonia dioica	o	o	o	o		o		
Calamintha acinos ...		o	r	o		o		
Calluna vulgaris ...						r	l	
Calystegia sepium ...								*
Campanula glomerata ...		r	r	o		o	o	
Campanula rotundifolia	r			o		a	f–a	
Campanula trachelium ...	o	o	o		o			
Capsella bursa-pastoris ...								*
Cardamine flexuosa ...			r					
Cardamine hirsuta ...			o					
Cardamine pratensis ...			o					
Carduus crispus	o	o	lf	o	o			
Carduus nutans			r			r		
Carex caryophyllea ...				o	o	f	o	
Carex divulsa			r					
Carex flacca (glauca) ...	r	r–o	o	f–a		a	f	
Carex hirta							l	
Carex muricata								*
Carex pallescens ...			o					
Carex pilulifera							r	
Carex remota								*
Carex silvatica	o	o	f	o				
Carex vulpina			r				r	
Carlina vulgaris				o		o	o	
Castanea sativa			r					
Caucalis anthriscus ...		l	lf					
Centaurea cyanus ...								*
Centaurea nigra		r	o	f	f	o	o–f	
Centaurea scabiosa				o		r		
Cephalanthera grandiflora	o	r						
Cerastium semidecandrum						o		
Cerastium viscosum ...			r					
Cerastium vulgatum ...		o	o		f	o	o	
Chaerophyllum temulum			o	o				
Chelidonium majus ...	r							
Chenopodium album ...								*
Chenopodium bonus-henricus								*
Chrysosplenium oppositifolium	r							*
Cichorium intybus ...								
Circaea lutetiana ...	l	o	la		f			
Cirsium acaule		r	r	o		a	f	

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Cirsium arvense		r	r	r	o	o	o	
Cirsium lanceolatum ...	r	lf	o	o	o	o		
Cirsium palustre	o	o	o–f	o	o	lf	f	
Clematis vitalba ...	o–lf	lf	o	f		o		
Clinopodium vulgare ...	o	la	lf	la	f–la	lf	lf	
Conium maculatum ...			r					
Conopodium majus ...			f			r		
Convolvulus arvensis ...			o					
Cornus sanguinea ...	f	a–ld	f–a	a–ld	f	o		
Corylus avellana	o–f	f–a	a–ld	o–f	la	o		
Crataegus oxyacantha ...	o	f	f	a	la	o–f	o	
Crepis biennis								*
Crepis capillaris								
Crepis taraxacifolia ...			r					
Cucubalus behen (Silene inflata)		r	r	o		r		
Cynoglossum officinale ...				f		l		
Cynosurus cristatus ...			r		f	lf	f	
Cytisus scoparius ...					r			
Dactylis glomerata ...	r	o	o	o	o	o	o	
Daucus carota	r		o			o		
Deschampsia caespitosa	r		l					
Deschampsia flexuosa ...							r	
Digitalis purpurea ...			lf		lf			
Dipsacus silvestris ...			o		o			
Echium vulgare				r		r		
Epilobium angustifolium	la	la	la		la	o		
Epilobium hirsutum ...		o	o–f					
Epilobium montanum ...	f	f	f	o	o			
Epilobium parviflorum ...		la	f–la	o				
Epilobium tetragonum ...			f–la					
Epipactis latifolia ...	o	o	o	o		o		
Erigeron acre				o				
Erythraea centaurium ...		o	o	o	o	r	o	
Euonymus europaeus ...	f	f–la	f–la	f		o		
Eupatorium cannabinum		la	o					
Euphorbia amygdaloides	o–f	f	f	o	o			
Euphorbia exigua ...			r					
Euphorbia helioscopia ...								*
Euphorbia peplus ...								*
Euphrasia brevipila ...						o	o	
Euphrasia nemorosa ...		o	o	o		f	f	
Fagus silvatica	d	o–la	o	o		r	r	
Festuca bromoides ...							o	
Festuca elatior								*
Festuca gigantea ...	l		o		l			
Festuca ovina	r			la	f	va	f–a	
Festuca rigida						o		
Festuca rubra				lf		o	f	
Filago germanica ...			r					

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Fragaria vesca	f	f	f–a	a	f	o	lf	
Fraxinus excelsior ...	f–la	a–ld	f–a	o–la	o	o	o	
Fumaria officinalis ...								*
Galeopsis ladanum ...						r		
Galeopsis tetrahit ...			o					
Galium aparine			o					
Galium cruciata	r	o	o	f	f	o	f	
Galium erectum		o	r	o		o		
Gallium mollugo		r	r	o		o	o	
Galium saxatile					r		r	
Galium verum			r			f	f	
Gentiana amarella ...		r		f		o		
Geranium columbinum ...			lf	o		r		
Geranium dissectum ...			lf					
Geranium pusillum ...			o					
Geranium robertianum ...	o	o	o		o–f	r		
Geum urbanum	r	o–f	f	o	f			
Gnaphalium uliginosum			o					
Gymnadenia conopsea ...				r		r		
Habenaria virescens ...		o	o			r		
Hedera helix	la	lf	lf	o	o	o		
Helianthum vulgare ...				a		a	lf	
Helleborus viridis ...	r							
Heracleum sphondylium	o	o	o		o	o	o	
Hieracium boreale ...					r			
Hieracium pilosella ...		o	o	f		la	la	
Hieracium silvaticum ...	r	r	o					
Hippocrepis comosa ...						l		
Holcus lanatus		la	la	f	f	o	lf	
Holcus mollis			l					
Hordeum silvaticum ...			o					
Humulus lupulus ...			o					
Hypericum androsaemum			r					
Hypericum hirsutum ...	o	f	f	f		o		
Hypericum humifusum ...			o		o			
Hypericum perforatum ...	l	o–f	f–la	f	la	o	la	
Hypericum pulchrum ...		r	o		o			
Hypericum quadrangulum							o	
Hypochaeris radicata ...		r	o	o		o		
Ilex aquifolium	o	o	lf		lf	r		
Inula squarrosa		o	o	f				
Juncus bufonius ...							r	
Juncus conglomeratus ...		r	r					
Juncus effusus			l					
Juniperus communis ...				lf		lf		
Koeleria gracilis ...						f		
Lactuca muralis ...	o							
Lamium album								*
Lamium galeobdolon ...	o–f	f	f		o			
Lamium purpureum ...								*

	1 Beech Wood.	2 Calcicolous Coppice.	3 Oakwood and Coppice on deep soil.	4 Chalk Scrub.	5 Other Scrub.	6 Chalk Grassland.	7 Other Grassland.	8 Paths, Arable, etc.
Lapsana communis ...	r	r	lf			r		
Lathyrus montanus ...			o					
Lathyrus pratensis ...			o	o				*
Lemna minor								
Leontodon autumnale ...		o	r	o	o	f	f	
Leontodon hispidum ...		o	o	o	o	a	f	
Lepidium campestre ...			r					
Leucanthemum vulgare			o	o		o	o	
Ligustrum vulgare ...	o	o	r	o				
Linaria cymbalaria ...								*
Linaria elatine								*
Linaria spuria								*
Linaria vulgaris								
Linum catharticum ...		o		o		f	f	
Listera ovata	o	lf	lf	o	o			
Lithospermum officinale...		o	o	o				*
Lolium italicum								
Lolium perenne		r	r			o	o	
Lonicera periclymenum ...	r–o	lf	la		la	r		
Lotus corniculatus ...		o		o	f	a	f–a	
Lotus uliginosus		o	o					
Luzula campestris ...				o	f	lf	f	
Luzula forsteri	o		o					
Luzula multiflora ...			l					
Luzula pilosa	o	o	o					
Luzula silvatica			r					
Lychnis floscuculi ...			o					
Lysimachia nemorum ...			r					
Lysimachia nummularia			o					
Malva moschata		o	o		o		o	
Malva rotundifolia ...								*
Malva silvestris ...								*
Matricaria chamomilla ...								*
Matricaria inodora ...			o			r		
Matricaria suaeveolens ...								*
Medicago lupulina ...				o		f		
Melampyrum pratense ...	r							
Melandryum album (Lychnis vespertina)		r	o	r	o			
Melandryum dioicum (Lychnis dioica)	r	o	f		o			
Melandryum noctiflorum (Silene noctiflora)								*
Melica uniflora	f	lf	o					
Mentha arvensis		r	r	r				
Mercurialis annua ...								*
Mercurialis perennis ...	ld	a–ld	a	la	lf	l		
Milium effusum			r					
Monotropa hypopitys ...	o	r						
Myosotis arvensis ...	o	o	o	o–f		lf		

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Myosotis collina							o	
Myosotis versicolor ...							o	
Nasturtium officinale ...								*
Neottia nidus-avis ...	o	r	r					
Nepeta hederacea ...		la	f–la	f–a	f		la	
Nephrodium dilatatum	r							
Nephrodium filix-mas ...	o	o	o	r				
Onobrychis viciaefolia ...								*
Ononis repens				o		lf		
Ophioglossum vulgatum		r						
Ophrys apifera				o		o		
Ophrys muscifera ...	r							
Orchis maculatus ...		r	r			r		
Orchis masculus ...		o	o			r		
Orchis pyramidalis ...				o		o		
Origanum vulgare ...		la	o	la	la	lf	la	
Oxalis acetosella	r		o	r				
Paris quadrifolia ...	l	lf	o					
Pastinaca sativa		o–lf	o	lf		lf	lf	
Papaver rhoeas				r		r		
Pedicularis silvatica ...							l	
Phleum pratense ...		r				f		
Phyteuma orbiculare ...				r		o		
Picris echioides			r	o				
Picris hieracioides ...			o	o				
Pimpinella saxifraga ...			o	o		o		
Plantago lanceolata ...		r	o	o		f–a	f–a	
Plantago major			r					
Plantago media		r		o		o		
Poa annua			o	r				
Poa nemoralis	o	o	o					
Poa pratensis	r				o	o		
Poa trivialis	o	o	f			o	o	
Polygala serpyllacea ...							r	
Polygala vulgaris ...		r		o	o	f	o	
Polygonatum multiflorum	o	o	r	l				
Polygonum aequale ...								*
Polygonum aviculare ...			r					
Polygonum convolvulus ...			r			r		
Polygonum persicaria ...								*
Polypodium vulgare ...			r	r				
Polystichum aculeatum ...			r					
Populus tremula ...			o					
Potentilla anserina ...		o		o		o	o	
Potentilla erecta			o		o–f	lf	o–f	
Potentilla procumbens ...			r		r		o	
Potentilla reptans ...		o	o	o–f	o	o	o	
Potentilla sterilis ...		o–f	f	o–f	o	r		
Poterium sanguisorba ...		r		f		la	lf	
Primula veris	r	o	o	o	o	o	o	

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Primula vulgaris ...	o	o–f	f–a	o	o			
Prunella vulgaris ...	o	o	f	f	o	f	o	
Prunus avium		o	o		o			
Prunus insititia				f				
Prunus spinosa	o	o–la	o	a		o–lf		
Pteridium aquilinum ...	l	r	la		la		ld	
Pulicaria dysenterica ...				r				
Pyrus aria	o	o	o	lf		o		
Pyrus aucuparia				r				
Pyrus malus	r	o	o					
Quercus robur (pedunculata)	r	o	o–d	l	ld	r	o	
Ranunculus acer ...				o			o	
Ranunculus bulbosus ...			o	o		f	o	
Ranunculus ficaria ...	r		lf					
Ranunculus repens ...	o	o	o	o	o	r	o	
Raphanus raphanistrum								*
Reseda lutea		r		o				
Reseda luteola		o	r			l		
Rhamnus catharticus ...		o		o		o		
Rhinanthus cristagalli ...								*
Ribes grossularia ...	o	o	o	o				
Ribes rubrum			r					
Rosa arvensis	f	f	f	f–a	f	o	o	
Rosa canina	o	f	f	f	f	o		
Rosa micrantha		f	o	f		o		
Rosa rubiginosa		o	o	f		o		
Rubus caesius	o–f	f–a	f–a	a		o		
Rubus idaeus		o	o		f–a	o		
Rubus leucostachys ...	o	f	f–a	a	f			
Rubus macrophyllus ...			lf		f–a			
Rubus rusticanus ...	o	f	o	a	f–a	o	o	
Rumex acetosa		o				o		
Rumex condylodes ...	o		o		f			
Rumex crispus			r	o		r	o	
Rumex obtusifolius ...						r		
Ruscus aculeatus ...	r		r					
Sagina nodosa								*
Sagina procumbens ...		o	o				o	
Salix caprea	o	o	o	o	o	o		
Salix cinerea		r	o	r				
Sambucus nigra	o–f	o	o	f		o		
Sanicula europaea ...	f–la	f	f	f		r		
Saxifraga tridactylites ...						r		
Scabiosa arvensis ...				o		l		
Scabiosa columbaria ...			r	o		lf		
Scabiosa succisa ...			lf	o		o	lf	
Scandix pecten-veneris ...								*
Scilla nonscripta	la		f–la					
Scolopendrium vulgare ...	r							

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Scrophularia aquatica ...				r				
Scrophularia nodosa ...	o	o	o					
Sedum acre						la		
Sedum telephium ...			o					
Senecio erucifolius ...			r	o		o		
Senecio jacobaea ...	o	lf	o–la	la	o	lf	la	
Senecio vulgaris	r	r	o			r		
Sherardia arvensis ...			o					
Sieglingia decumbens ...							r	
Sinapis alba								*
Sinapis arvensis								*
Sisymbrium alliaria ...	l	l	lf					
Sisymbrium officinale ...								*
Solanum dulcamara ...		o	o		o	o		
Solanum nigrum								*
Sonchus arvensis ...			r					
Sonchus asper			o	r		r		
Sonchus oleraceus ...		o		r				
Specularia hybrida ...								*
Spiranthes autumnalis ...						o		
Stachys arvensis			r					
Stachys officinalis ...		o	o				o	
Stachys silvatica ...	o	o	o		o			
Stellaria graminea ...			o		o		lf	
Stellaria holostea ...			o					
Stellaria media		r	o			r		
Tamus communis ...	o	o	o					
Taraxacum erythrosper-mum						f		
Taraxacum officinale ...	o	o	o	o		o	o	
Taxus baccata	la	l	o	la–ld		l		
Teucrium scorodonia ...	o	la	la	la		la		
Thlaspi arvense								*
Thymus ovatus ...							r	
Thymus serpyllum ...		r	o	f	o	a	f	
Tragopogon minus ...								*
Trifolium dubium ...						r	o	
Trifolium hybridum ...								*
Trifolium medium ...								*
Trifolium pratense ...			o	o		f	f	
Trifolium procumbens ...			r			o		
Trifolium repens				o	o	o	o–f	
Trisetum flavescens ...		o	o	o		f		
Tussilago farfara ...	l		o	l		r		
Ulex europaeus							o	
Ulmaria palustris ...	r					r		
Ulmus campestris ...								*
Ulmus glabra (U. montana)	o	o		o				
Ulmus hollandica ...								*

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Urtica dioica	lf	lf	la	l		o		
Valeriana officinalis ...	o	o	f	o				
Valerianella dentata ...								*
Verbascum nigrum ...		o–f	o	o		o	o	
Verbascum thapsus ...		o	o	o		r		
Verbena officinalis ...			o					
Veronica agrestis ...			o					
Veronica arvensis ...		r		o		o	o	
Veronica buxbaumii ...								*
Veronica chamaedrys ...	o	o	f	f	f	o	o	
Veronica hederaefolia ...								*
Veronica montana ...	o		o				r	
Veronica officinalis ...	o	o	o	o	o	o	o	
Veronica serpyllifolia ...			r					
Viburnum lantana ...	o	o	o	la		o		
Viburnum opulus ...	r	o	o	f				
Vicia angustifolia ...			r					
Vicia cracca		r	o	r		r	o	
Vicia hirsuta			r	r		r		
Vicia sativa								*
Vicia sepium	o	o	o		f			
Viola arvensis			o					
Viola calcarea						o		
Viola canina							r	
Viola hirta	o	f	o	la		la	lf	
Viola odorata		r						
Viola riviniana	f	f	f–a	f	f	o	o–f	
Viola silvestris	f–la	f–a	o–f	f		r		
BRYOPHYTES.								
Amblystegium serpens ...	o	o	o					
Anomodon viticulosus ...	f	o–f	o					
Barbula cylindrica ...	o	f	o	o–f		lf		
Barbula fallax	o			o		o		
Barbula lurida						o		
Barbula rigidula						o		
Barbula rubella	o	o				o		
Barbula unguiculata ...	o	r				o		
Brachythecium glareosum	f	f	o	f		o–f	o	
Brachythecium purum ...	o	o–f	o	o–f	f	a	a	
Brachythecium rutabulum	f	a	a		f			
Brachythecium salebrosum	o		f					
Brachythecium velutinum	o	f	f	o				
Bryum argenteum ...					l			*
Bryum caespitium ...				o				
Bryum capillare ...	r	o	o	o		o		
Bryum inclinatum ...						o		
Bryum pallens						lf		

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Calypogeia trichomanis ...			r					
Camptothecium lutescens	o	f	f	f		o	f	
Camptothecium sericeum	f	r	o					
Catharinea undulata ...	o	r	f–a		f			
Ceratodon purpureus ...					l		o	
Chiloscyphus pallescens		o						
Dicranoweisia cirrata ...		o						
Dicranella heteromalla ...			l					
Dicranella varia						la		
Dicranum montanum ...	f							
Dicranum scoparium ...	o	o	o			la	la	
Ditrichum flexicaule ...						l		
Eurhynchium confertum	o			o				
Eurhynchium crassinervum	o							
Eurhynchium megapolitanum				o		f		
Eurhynchium praelongum	o	o	f		o	o		
Eurhynchium pumilum ...	o							
Eurhynchium speciosum	r							
Eurhynchium striatum ...	f	f	f–la	la		o		
Eurhynchium swartzii ...	o	o	o	o				
Eurhynchium tenellum ...	r							
Fissidens adiantoides ...		r		o		o		
Fissidens bryoides ...	lf	o	la					
Fissidens taxifolius ...	r	o	o	o		r–o		
Frullania dilatata ...	a	o	f	o				
Frullania tamarisci ...						la		
Funaria hygrometrica ...		r	o			l		
Hylocomium splendens ...						la	lf	
Hylocomium squarrosum			f	o	o	f–a	a	
Hylocomium triquetrum	f	a	f–a	f		a	a	
Hypnum chrysophyllum		o		lf		la		
Hypnum cupressiforme ...	a	f	a	f	f	o	f	
Hypnum cupressiforme ... var. elatum				lf		la		
Hypnum cuspidatum ...		r	o			o		
Hypnum molluscum ...	a	a	f	a	o	f–la		
Isothecium myurum ...	o	o						
Lejeunia cavifolia ...		o						
Lophocolea alata ...			o					
Lophocolea bidentata ...	o	o	f–a	o	o	r–o		
Lophocolea cuspidata ...		o	o					
Lophocolea heterophylla	r	o	o–f					
Lophozia turbinata ...		lf				la		
Madotheca platyphylla ...	f		o	o				
Metzgeria furcata ...	a	o		f				
Mnium affine						o		
Mnium undulatum ...	o		f	o	o	r		
Neckera complanata ...	f	f		f		o		
Neckera crispa				lf		lf		

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Neckera pumila ...	o							
Orthotrichum affine ...	o		o	r				
Orthotrichum anomalum	o							
Orthotrichum diaphanum				o				
Orthotrichum pulchellum	r							
Pellia calycina			l			l		
Plagiochila asplenioides			f					
Plagiothecium depressum	o							
Polytrichum formosum ...	l		la					
Polytrichum gracile ...	o						o	
Polytrichum piliferum ...						lf	la	
Porotrichum alopecurum	f	a	a	a	f			
Pottia lanceolata ...						r		
Pylaisia polyantha ...		o	o					
Radula complanata ...	f	o	o					
Rhacomitrium lanuginosum						la		
Seligeria calcarea ...	f			f		lf		
Seligeria pusilla ...	o							
Thuidium abietinum ...						la	lf	
Thuidium tamariscinum	o–f	f–a	a	f		o		
Tortula laevipila ...				o				
Tortula muralis								*
Tortula ruralis						l		
Trichostomum tortuosum				o		lf	l	
Ulota crispa	r							
Webera carnea						l		
Zygodon viridissimus ...	o							