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Transition Coppice

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The geographical evidence is quite against the possibility of the calcicolous coppice occupying areas to which beech has not yet penetrated: it is also against its origin as the result of the tending and cutting of chalk scrub. This scrub will be considered later; it is also to be regarded as a seral community belonging to the same seral complex, of which the beech forest is to be regarded as the climax.

4. "TRANSITION COPPICE." (Plate VIII, Fig. 1.)

The coppiced woods provisionally grouped under this head have much in common with the calcicolous coppice in their situations and flora, but at the same time exhibit some of the features of the oak hazel coppices.

SOIL.

These transition coppices occupy slopes or portions of the edge of the plateau, but in all cases there is a layer of leached non-calcareous soil overlying the chalk. This soil varies considerably in depth: on the plateau edge it may be 2 ft. (60 cm.) or more, while on steeper slopes it may thin out to 2-4 ins. (5-10 cm.). The soil is like that of the plateau beech woods, a fine grained yellow loam with numerous flints, which often form a continuous layer on slopes covering the surface of the soil. So far as it has been tested the reaction of these soils is neutral or very slightly on the acid side of the neutral point. No reaction is given with potassium thiocyanate and only a very slight effervescence, or none, occurs with hydrochloric acid.

This type of coppice occurs in four parts of the estate:

(1) At the south end of Downley Hanger on the slope due east of Ditcham House. This part shows the closest resemblance to calcicolous coppice and merges gradually into it (Fig. 12, p. 180).

(2) On the crest of the ridge that runs south-west from the house, adjoining and just below the beech woods.

(3) On the steep lower slopes facing west, to the south of Oakham Bottom (Fig. 12, p. 180).

(4) On the edge of the plateau south-east of the top of Oakham Bottom.

Of these areas (1) and (3) overlie the Middle Chalk while (2) and (4) overlie Upper Chalk.

LIST OF FLORA.

	I. Downley Hanger South end	II. Crest of S.W. ridge			III. W. slope		IV. Edge of plateau above Oakham Bottom	
		1. Shade phase	2. Inter- mediate	3. Light phase	1. Shade phase	2. Light phase	1. Shade phase	2. Light phase
<i>Woody Plants:</i>								
<i>Acer campestre</i>	o.	—	—	o.	o.	o.	o.	o.
<i>Betula alba</i>	o.	o.	o.	o.	—	—	o.	o.
<i>B. pubescens</i>	r.	—	—	—	—	—	—	r.
<i>Cornus sanguinea</i>	f.	f.	d.	a.—l.d.	f.	f.	o.	f.
<i>Corylus avellana</i>	d.	f.	f.	f.	a.	a.	o.—f.	a.
<i>Crataegus oxyacantha</i>	o.	—	o.	o.	o.	o.	o.	o.
<i>Euonymus europaeus</i>	f.	—	—	—	—	o.	—	—
<i>Fagus sylvatica</i>	—	o.	—	o.	o.	o.	o.	—
<i>Fraxinus excelsior</i>	a.	a.—l.d.	a.	v.a.—d.	f.—a.	a.	d.	a.
<i>Ilex aquifolium</i>	—	o.	—	r.	o.	r.	—	—
<i>Prunus avium</i>	—	o.	—	r.	—	—	—	—

<i>Woody Plants cont.:</i>	I. Down'ey Hanger South end	II. Crest of S.W. ridge			III. W. slope		IV. Edge of plateau above Oakham Bottom	
		1. Shade phase	2. Inter- mediate	3. Light phase	1. Shade phase	2. Light phase	1. Shade phase	2. Light phase
<i>Pyrus malus</i>	—	—	—	—	—	o.	—	r.
<i>Quercus robur</i>	—	o.	o.	o.	o.	o.	o.	o.
<i>Rosa arvensis</i>	—	o.	—	o.	o.	—	r.	o.
<i>R. lutetiana</i>	—	o.	—	o.	—	o.	—	—
<i>Rubus caesius</i>	l.	l.f.	f.	f.—a.	f.	f.—a	—	f.
<i>R. idaeus</i>	r.	—	—	—	—	—	—	—
<i>R. leucostachys</i>	a.	o.	f.	f.—a.	f.	—	o.	f.
<i>R. rusticanus</i>	—	—	—	o.—f	—	o.	—	—
<i>Salix caprea</i>	o.	r.	—	r.	—	—	—	o.
<i>Sambucus nigra</i>	r.	—	—	—	—	—	—	—
<i>Sorbus aria</i>	—	—	—	o.	r.	o.	o.	—
<i>Taxus baccata</i>	—	—	—	r.	—	—	—	—
<i>Viburnum lantana</i>	—	o.	o.	o.	—	o.	o.	—
<i>Ground Flora:</i>								
<i>Agrostis alba</i>	o.	—	o.	o.	—	o.	r.	o.
<i>Ajuga reptans</i>	l.a.	f.	f.	—	—	d.	f.	f.
<i>Anemone nemorosa</i>	o.	r.	—	o.	—	—	—	—
<i>Angelica silvestris</i>	o.	—	—	—	—	—	—	—
<i>Arabis hirsuta</i>	o.	—	—	—	—	—	—	—
<i>Arctium minus</i>	f.	o.	—	o.	—	—	—	o.
<i>Arenaria serpyllifolia</i>	r.	—	—	—	—	—	—	—
<i>Arrhenatherum elatius</i>	—	—	o.	l.	—	—	—	—
<i>Asperula odorata</i>	—	—	—	—	—	—	o.	—
<i>Atropa belladonna</i>	—	—	—	o.	—	—	—	—
<i>Brachypodium silvaticum</i>	—	—	o.	o.	—	—	—	o.
<i>Bromus ramosus</i>	—	r.	—	—	—	—	o.	o.
<i>Bryonia dioica</i>	r.	—	—	—	—	—	—	—
<i>Calamintha acinos</i>	—	—	—	o.	—	—	—	—
<i>Campanula trachelium</i>	o.	o.	o.	o.	—	—	o.	—
<i>Carduus crispus</i>	o.	—	—	—	—	o.	—	—
<i>Carex flacca</i>	—	—	—	r.	—	—	—	—
<i>C. silvatica</i>	o.	f.	—	—	—	o.	o.	o.
<i>Caucalis anthriscus</i>	—	—	—	o.	—	l.f.	—	—
<i>Cerastium vulgatum</i>	o.	—	—	o	—	—	—	—
<i>Circaea lutetiana</i>	—	l.a.	—	—	l.	—	l.	l.a.
<i>Cirsium acaule</i>	r.	—	—	—	—	—	—	—
<i>C. arvense</i>	o.	—	—	—	—	o.	—	—
<i>C. lanceolatum</i>	—	—	r.	—	—	—	—	r.
<i>C. palustre</i>	o.	—	o.	o.	—	o.	—	o.
<i>Clematis vitalba</i>	—	—	—	—	—	o.	—	—
<i>Clinopodium vulgare</i>	o.	—	o.	f.	—	o.	—	o.
<i>Dactylis glomerata</i>	—	—	—	o.	—	—	—	—
<i>Digitalis purpurea</i>	l.	r.	r.	—	—	—	—	—
<i>Epilobium angustifolium</i>	f.	l.	l.a.	l.	—	l.a.	—	l.
<i>E. hirsutum</i>	r.	—	—	—	—	—	—	—
<i>E. montanum</i>	f.	o.	o.	o.	l.	f.	o.	o.
<i>E. parviflorum</i>	f.	r.	—	—	—	a.	—	—
<i>Epipactis latifolia</i>	r.	—	—	r.	—	—	—	—
<i>Erythraea centaurium</i>	o.	—	r.	f.	—	—	—	r.
<i>Eupatorium cannabinum</i>	o.	—	—	—	—	—	—	—
<i>Euphorbia amygdaloides</i>	f.	f.	o.	o.	—	o.	o.	—
<i>Euphrasia nemorosa</i>	—	—	P.	—	—	—	—	—
<i>Fragaria vesca</i>	a	f.	f.	a.	l.f	a.	o.	a.
<i>Galium cruciata</i>	—	—	o.	o.	—	l.	—	—
<i>G. mollugo</i>	—	—	r.	—	—	—	—	—
<i>Geranium robertianum</i>	—	—	—	o.	—	—	—	—
<i>Geum urbanum</i>	—	o.—f.	—	—	—	o.	o.	o.
<i>Hieracium pilosella</i>	—	—	P.	l.	—	—	—	—
<i>Holcus lanatus</i>	—	r.	o.	o.	—	o.	—	o.
<i>Hypericum androsaemum</i>	—	r.	—	—	—	—	—	—

<i>Ground Flora cont.:</i>	I Downley Hanger South end	II. Crest of S.W. ridge			III. W. slope		IV. Edge of plateau above Oakham Bottom	
		1	2. Inter-	3. Light	1. Shade	2. Light	1. Shade	2. Light
		phase	mediate	phase	phase	phase	phase	phase
<i>Hypericum hirsutum</i>	f	o.	o.	f.—a.	—	f.	—	f.
<i>H. perforatum</i>	a.—l.d.	r.	o.	a.	—	f.	—	f.
<i>H. pulchrum</i>	o.	r.	—	o.	—	—	—	o.
<i>Hypochoeris radicata</i>	r.	—	—	—	—	—	—	—
<i>Inula squarrosa</i>	—	—	—	o.	—	o.	—	—
<i>Juncus conglomeratus</i>	—	—	—	—	—	—	—	l.
<i>Lamium galeobdolon</i>	o.	—	—	—	—	—	—	—
<i>Lapsana communis</i>	—	—	—	—	—	o.	—	—
<i>Lathyrus montanus</i>	—	—	—	—	—	—	—	—
<i>Leontodon autumnale</i>	—	—	r.	—	—	—	—	—
<i>Linum catharticum</i>	—	—	—	o.	—	—	—	—
<i>Listera ovata</i>	—	o.	—	—	—	—	—	—
<i>Lithospermum officinale</i>	—	—	r.	—	—	o.	—	—
<i>Lonicera periclymenum</i>	o.	o.	—	o.	o.	—	l.	l.
<i>Lotus corniculatus</i>	—	—	P.	—	—	—	—	r.
<i>L. uliginosus</i>	—	—	—	—	—	o.	—	—
<i>Luzula forsteri</i>	—	o.	—	—	—	—	—	—
<i>L. multiflora</i>	—	l.	—	—	—	—	—	—
<i>L. pilosa</i>	o.	r.	o.	o.	o.	o.	—	—
<i>Lychnis flos-cuculi</i>	—	r.	—	—	—	—	—	—
<i>Lysimachia nemorum</i>	—	—	—	—	—	—	—	o.
<i>Malva moschata</i>	o.	—	—	r.	—	—	—	—
<i>Mercurialis perennis</i>	l.d.	l.a.	l.	l.	l.a.	l.a.	l.	—
<i>Myosotis arvensis</i>	—	r.	—	—	—	o.	—	o.
<i>Nepeta hederacea</i>	f.	o.	o.	—	—	o.	o.	f.
<i>Nephrodium filix mas</i>	o.	o.	—	o.	—	—	o.	o.
<i>Origanum vulgare</i>	o.	—	o.	f.	l.	l.a.	—	o.
<i>Pastinaca sativa</i>	—	—	—	—	—	o.	—	—
<i>Plantago lanceolata</i>	—	—	P.	—	—	—	—	—
<i>Platanthera chlorantha</i>	—	—	—	—	—	o.	—	—
<i>Poa nemoralis</i>	—	o.	—	—	—	—	—	—
<i>P. trivialis</i>	—	r.	—	—	—	o.	—	—
<i>Polygala vulgaris</i>	—	—	—	—	—	r.	—	—
<i>Potentilla erecta</i>	—	l.	—	—	—	—	—	r.
<i>P. reptans</i>	—	r.	—	—	—	—	—	—
<i>P. sterilis</i>	f.	f.	—	o.	—	—	—	—
<i>Poterium sanguisorba</i>	—	—	r.	r.	—	o.	—	—
<i>Primula veris</i>	—	—	P.	—	—	o.	—	r.
<i>P. vulgaris</i>	o.	o.	—	o.	o.	o.	f.	o.
<i>Prunella vulgaris</i>	f.	o.	o.	f.	—	o.	—	o.
<i>Pteridium aquilinum</i>	—	l.a.—l.d.	l.d.	—	l.a.	—	l.	l.a.
<i>Ranunculus repens</i>	r.	—	r.	—	—	o.	—	—
<i>Rumex condylodes</i>	—	o.	—	—	—	—	—	—
<i>Sagina procumbens</i>	o.	—	—	r.	—	—	—	—
<i>Sanicula europaea</i>	—	—	—	—	—	l.a.	o.	—
<i>Scilla nonscripta</i>	—	—	—	—	—	—	l.a.	—
<i>Scrophularia nodosa</i>	o.	o.	o.	o.	—	o.	—	—
<i>Senecio jacobaea</i>	l.f.	—	—	o.—f.	—	o.	—	o.
<i>Solanum dulcamara</i>	r.	—	—	—	—	r.	—	—
<i>Stachys officinalis</i>	—	—	—	r.	—	—	—	—
<i>Tamus communis</i>	—	—	—	—	—	o.	o.	—
<i>Teucrium scorodonia</i>	f.	l.	f.	l.	—	—	—	—
<i>Thymus serpyllum</i>	—	—	P.	r.	—	—	—	—
<i>Trisetum flavescens</i>	—	—	—	—	—	r.	—	—
<i>Urtica dioica</i>	l	o.	o.	—	—	—	—	—
<i>Valeriana officinalis</i>	—	—	o.	f.	—	—	—	—
<i>Verbascum nigrum</i>	—	—	o.	o.	—	r.	—	—
<i>V. thapsus</i>	o.	—	o.	o.	—	o.	—	—
<i>Veronica chamaedrys</i>	o.	o.	f.	o.	l.	o.	o.	o.
<i>V. montana</i>	—	r.	—	—	—	—	—	—
<i>V. officinalis</i>	o.	o.	—	o.	—	o.	—	—
<i>Viola hirta</i>	a.	o.	o.	f.	—	a.	—	—

<i>Ground Flora cont.:</i>	I. Downley Hanger South end	II. Crest of S.W. ridge			III. W. slope		IV. Edge of plateau above Oakham Bottom	
		1. Shade phase	2. Inter- mediate	3. Light phase	1. Shade phase	2. Light phase	1. Shade phase	2. Light phase
<i>Viola odorata</i>	—	—	—	—	—	o.	—	—
<i>V. riviniana</i>	f.	f.	o.	f.	f.	l.a.	f.	f.
<i>V. silvestris</i>	o.	—	o.	o.	—	—	—	o.
<i>Bryophytes:</i>								
<i>Anomodon viticulosus</i>	—	—	r.	—	—	r.	—	—
<i>Barbula rubella</i>	—	—	—	r.	—	r.	—	—
<i>B. unguiculata</i>	—	—	o.	—	—	r.	—	—
<i>Brachythecium purum</i>	—	—	o.	f.	—	o.	o.	—
<i>B. rutabulum</i>	a.	f.—a.	o.	f.	a.	f.	f.	o.
<i>B. salebrosum</i>	o.	o.	—	—	f.	—	f.	o.
<i>B. velutinum</i>	—	o.	—	—	o.	—	—	—
<i>Camptothecium lutescens</i>	—	—	o.	o.	—	o.	—	—
<i>Catharinea undulata</i>	—	—	—	—	—	—	—	l.a.
<i>Dicranum scoparium</i>	o	l.	—	l.f.	—	—	—	—
<i>Eurhynchium praelongum</i>	—	—	—	—	—	o.	—	—
<i>E. striatum</i>	—	—	—	—	—	—	—	—
<i>Fissidens bryoides</i>	—	—	—	—	—	—	—	—
<i>F. taxifolius</i>	—	o.	r.	o	f.	r.	—	—
<i>Frullania dilatata</i>	—	r.	—	—	—	—	r.	—
<i>Funaria hygrometrica</i>	—	—	—	l.	—	—	—	—
<i>Hylocomium triquetrum</i>	o.	f.	o.	a.	a.—d.	f.	a.—l.d.	a.
<i>Hypnum chrysophyllum</i>	—	—	—	o.	—	l.f.	—	—
<i>H. cupressiforme</i>	a.	a.	f.	f.	a.	a.	a.	a.
<i>H. molluscum</i>	—	—	o.	o.	—	o.	o.	o.
<i>Isoetecium myurum</i>	—	—	r.	—	—	—	—	—
<i>Lophocolea bidentata</i>	—	—	o.	—	—	—	—	—
<i>Mnium hornum</i>	l.a.	f.	—	—	f.	—	—	l a.
<i>Porotrichum alopecurum</i>	—	—	—	—	—	—	f.	o.
<i>Pylaisia polyantha</i>	—	r.	—	—	o.	—	—	—
<i>Thuidium tamariscinum</i>	o.	a.	o.	l.f.	v.a.	o.	a.	f.

COMPOSITION AND STRUCTURE OF VEGETATION.

These transition coppices have in general more numerous standards than are present in calcicolous coppice, *Fagus silvatica* and *Fraxinus excelsior* being the most abundant: except in Downley Hanger *Quercus robur* standards are present though never abundant and are frequently rather poorly developed trees. The beech trees are young and of small size, as in calcicolous coppice. In the coppice layer *Corylus avellana* is very much more abundant than in calcicolous coppice and may be as abundant as *Fraxinus excelsior*. It may even share dominance with it, or be itself dominant. In Downley Hanger, where this coppice adjoins calcareous coppice, the passage to the leached soil is marked by an increasing percentage and final dominance of *Corylus avellana* and a corresponding decrease in *Fraxinus* and *Betula alba*. In other parts however *Fraxinus* is dominant even on soil which is quite non-calcareous (Plate VIII, Fig. 1). The other shrubs present are those occurring in calcicolous coppice, though there is less variety and those that do occur are in less abundance. The following, which are present in the calcicolous coppice, are absent here: *Ligustrum vulgare*, *Prunus spinosa*, *Rhamnus catharticus*, *Ribes grossularia*, *Ulmus glabra* and *Viburnum opulus*: while others are much less

abundant, as *Acer campestre*, *Sorbus aria* and *Viburnum lantana*. *Taxus baccata* is very rare in these coppices, only one tree having been recorded.

The ground flora shows perhaps greater differences: in the shade phase mosses are much less prominent and rarely form the thick continuous carpet which is such a feature of calcicolous coppice. The most abundant mosses in the shade phase are *Brachythecium rutabulum* and *Thuidium tamariscinum*, along with *Hylocomium triquetrum*. In the shade phase the ground is often nearly bare, such plants as are present being very thinly scattered. *Mercurialis perennis* occurs, but in patches only, and except in parts of Downley Hanger, is never dominant. The most abundant plants are *Ajuga reptans*, *Euphorbia amygdaloides*, *Fragaria vesca* and *Viola riviniana*. *Pteridium aquilinum* occurs in most of these coppices and is frequently abundant to locally dominant (Plate VIII, Fig. 1). *Primula vulgaris* and *Luzula pilosa* are scattered through them, and are both of much more general occurrence than in calcicolous coppice. Several species of the last named are here absent or present in very much less quantity, the most noticeable case being *Viola silvestris*, which is rather scarce and always much less abundant than *V. riviniana*.

In the light phase the flora is less rich and varied than in calcicolous coppice: the most abundant plants are generally *Hypericum perforatum*, *H. hirsutum* and species of *Rubus*, especially *R. caesius* and *R. leucostachys*. The number of invasional species is much less than in calcicolous coppice: among the more prominent are *Caucalis anthriscus*, *Clinopodium vulgare*, *Epilobium parviflorum* and *Origanum vulgare*, most of which are rather local in their distribution in the woods. *Epilobium angustifolium* is always present, but in patches only: it is never so abundant as in the light parts of woods on chalk soils. Bryophytes are much less abundant both in individuals and in species than in the calcicolous coppice: the absence of a moss carpet in the shade phase has already been noted. Epiphytic bryophytes are quite rare.

In these transition coppices there are a number of "oakwood" species which are quite absent from the chalk woods described in preceding sections. Among these are:

<i>Digitalis purpurea</i>	<i>Lysimachia nemorum</i>
<i>Hypericum androsaemum</i>	<i>Rumex condyloides</i>
<i>Lotus uliginosus</i>	<i>Catharina undulata</i>
<i>Luzula forsteri</i>	<i>Mnium hornum</i>
<i>L. multiflora</i>	

These transition coppices have the same relation to the beech woods on leached soils that calcicolous coppice has to the beech woods on chalk slopes. The geographical relations are less close: the Oakham Bottom plateau coppice forms an island almost surrounded by beech forest, and those on the S.W. ridge form a direct continuation of the beech woods higher up. On the slopes however no existing beech woods are present, but only coppice with beech standards. In part of the coppices on the west facing slope the beech standards,

with increasing size, have formed a close canopy and suppressed the coppice shrubs. Here at the present time under the canopy are seen the stools which have been killed by lack of light and which in many cases have entirely failed to sprout after their last coppicing. In these places the ground is almost bare of plants, a few odd specimens of *Ajuga reptans*, *Fragaria vesca* and *Viola riviniana* alone being present.

Owing to the somewhat dissimilar present habitats in regard to topography, the similarity of flora of the coppice and beech wood is not as great as on the chalk slopes. The following lists were made of the prominent ground species in the shade phase of a coppice on the S.W. ridge and their distribution in the adjacent beech wood:

	Coppice	Beech wood		Coppice	Beech wood
<i>Ajuga reptans</i>	f.	o.—l.f.	<i>Mercurialis perennis</i>	l.a.	l.
<i>Aretium minus</i>	o.	o.	<i>Pteridium aquilinum</i>	l.a.—l.d.	l.
<i>Carex silvatica</i>	f.	o.	<i>Viola riviniana</i>	f.	f.
<i>Epilobium angustifolium</i>	l.	l.	<i>Brachythecium rutabulum</i>	f.—a.	o.
<i>Euphorbia amygdaloides</i>	f.	o.	<i>Hylocomium triquetrum</i>	f.	—
<i>Fragaria vesca</i>	f.	—	<i>Hypnum cupressiforme</i>	a.	a.
<i>Geum urbanum</i>	o.—f.	—	<i>Mnium hornum</i>	f.	l.a.
<i>Luzula forsteri</i>	o.	o.	<i>Thuidium tamariscinum</i>	a.	l.f.

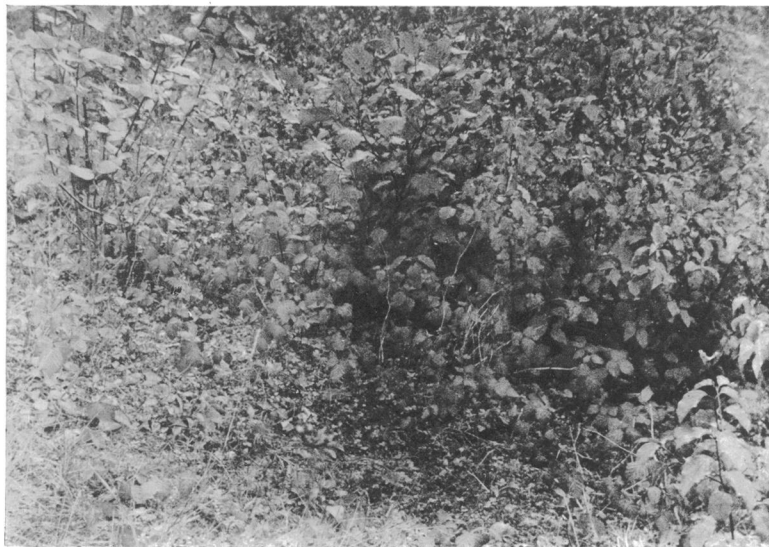
DEVELOPMENT—*CORNUS*-SCRUB. (Plate VII.)

One portion of an area of transitional coppice at the base of the west facing slope of Ditcham Down was completely cleared in 1896–7 with a view to the planting of larch. A strip thus cleared alongside the railway was not utilized for planting but has been left untouched ever since. This strip has become populated by a somewhat varied collection of herbaceous plants along with which is a considerable growth of shrubs. When the area was examined in 1913 these shrubs varied in size from seedlings to bushes 3–4 ft. in height. They were quite irregularly scattered, in parts forming an open scrub (Plate VII, Fig. 1), in other parts forming small close thickets. By far the most abundant species were *Cornus sanguinea* and *Viburnum lantana*, the latter in less quantity than the former. Plants of *Corylus avellana* were not infrequent but of small size (Plate VII, Fig. 2 centre) and for the most part associated with and sheltered by larger bushes of *Cornus* or *Viburnum*. While the larger plants of *Cornus* and *Viburnum* had reached the flowering and fruiting stage, *Corylus* had not. Other woody plants present were *Salix caprea* and locally *Betula alba*, with isolated examples of several other species. *Rubus caesius* was abundant (Plate VII, Fig. 2 foreground). A complete list of the flora of the area is given and for comparison the list of the immediately adjoining coppice in the light phase is added. Separate records for the years 1913, 1914 and 1920 are given. In 1913 only a preliminary survey was made and the frequency symbols are not complete. Occurrence, in cases where frequency was not noted, is marked by a +. The [indicates presence in the adjoining coppice only.



Phot. R. S. A. Sept. 1912

FIG. 1. General view. *Cornus sanguinea*, *Viburnum lantana* (left centre), *Betula alba* (right centre). The herbs in foreground are *Clinopodium vulgare*, *Origanum vulgare*, *Holcus lanatus*, *Epilobium* spp. etc.



Phot. R. S. A. Sept. 1912.

FIG. 2. Detail of scrub. *Cornus sanguinea* (right, etc.), *Corylus avellana* (centre), *Viburnum lantana* (left), *Rubus caesius* (left foreground), *Fragaria vesca*, *Viola hirta*, *Potentilla reptans*, *Cirsium acaule*, *Carex flacca*, *Holcus lanatus*, *Agrostis alba*, etc.

CORNUS-SCRUB—DEVELOPING "TRANSITION COPPICE"

ADAMSON—WOODLANDS OF DITCHAM PARK

<i>Woody Plants:</i>	Scrub			Adjoining coppice. Light phase
	1913	1914	1920	
<i>Acer campestre</i> ...	+	r.	—	o.
<i>Betula alba</i> ...	+	o.	.f.	—
<i>Clematis vitalba</i> ...	—	r.	r.	f.
<i>Cornus sanguinea</i> ...	a.	a.—l.d.	a.—l.d.	f.
<i>Corylus avellana</i> ...	+	o.	o.—f.	a.
<i>Crataegus oxyacantha</i> ...	+	r.	r.	o.
<i>Euonymus europaeus</i> ...	+	r.	o.	o.
[<i>Fagus silvatica</i> ...	—	—	—	o.
<i>Fraxinus excelsior</i> ...	—	—	r.	a.
<i>Quercus robur</i> ...	+	r.	r.	o.
<i>Rhamnus catharticus</i> ...	—	r.	o.	—
<i>Rosa arvensis</i> ...	+	—	o.	—
<i>R. lutetiana</i> ...	+	o.	o.	o.
<i>R. micrantha</i> ...	+	o.	o.	—
<i>Rubus caesius</i> ...	a.	a.	f.—a.	a.
<i>R. leucostachys</i> ...	+	o.	o.	—
<i>R. rusticanus</i> ...	+	—	—	o.
<i>Salix caprea</i> ...	+	o.	o.	—
<i>S. cinerea</i> ...	—	r.	r.	—
[<i>Sorbus aria</i> ...	—	—	—	o.
<i>Viburnum lantana</i> ...	+	f.	a.	o.
<i>V. opulus</i> ...	—	r.	—	—
<i>Ground Flora:</i>				
<i>Agrimonia eupatorium</i> ...	+	r.	o.	P.
<i>Agrostis alba</i> ...	+	l.	l.	—
<i>Anagallis arvensis</i> ...	—	r.	o.	—
<i>Ajuga reptans</i> ...	+	—	o.	—
<i>Alchemilla arvensis</i> ...	—	—	r.	—
[<i>Arctium minus</i> ...	—	—	—	o.
<i>Arenaria serpyllifolia</i> ...	—	—	o.l.	—
<i>Asperula cynanchica</i> ...	—	r.	—	—
[<i>A. odorata</i> ...	—	—	—	l.
<i>Bellis perennis</i> ...	+	l.a.	o.—f.	—
<i>Blackstonia perfoliata</i> ...	f.	r.	o.	—
<i>Brachypodium silvaticum</i> ...	+	o.	o.	—
<i>Calamintha acinos</i> ...	—	o.	o.	P.
<i>Campanula glomerata</i> ...	+	l.	—	P.
<i>C. rotundifolia</i> ...	—	r.	—	—
[<i>C. trachelium</i> ...	—	—	—	o.
[<i>Carduus crispus</i> ...	—	—	—	r.
<i>Carex flacca</i> ...	a.	a.—l.d.	f.—l.a.	—
<i>C. silvatica</i> ...	+	r.	o.	o.
<i>Carlina vulgaris</i> ...	+	o.	o.	—
[<i>Caucalis anthriscus</i> ...	—	—	—	o.
<i>Centaurea nigra</i> ...	—	r.	—	—
<i>C. scabiosa</i> ...	+	f.	o.	—
<i>Cerastium vulgatum</i> ...	—	o.	o.—l.a.	P.
<i>Cirsium acaule</i> ...	+	f.	f.—l.a.	—
<i>C. arvense</i> ...	—	r.	o.	o.
<i>C. palustre</i> ...	+	—	o.	o.
<i>C. lanceolatum</i> ...	+	—	—	—
<i>Clinopodium vulgare</i> ...	f.	f.—l.a.	v.a.	o.
<i>Crepis capillaris</i> ...	—	—	r.	—
<i>Cucubalus behen</i> ...	+	—	—	—
<i>Dactylis glomerata</i> ...	—	o.	—	—
[<i>Epilobium angustifolium</i> ...	—	—	—	l.
<i>E. montanum</i> ...	f.	f.	f.	a.
<i>E. parviflorum</i> ...	+	r.	—	a.
<i>Erigeron acre</i> ...	+	r.	o.l.	—
<i>Erythraea centaurium</i> ...	+	o.	f.	P.
<i>Euphorbia amygdaloides</i> ...	—	—	r.	o.
<i>E. exigua</i> ...	—	r.	o.	—
<i>Euphrasia nemorosa</i> ...	+	a.	o.	—
<i>Festuca ovina</i> ...	l.d.	l.	l.	a.
<i>Fragaria vesca</i> ...	+	a.	l.a.	—

<i>Ground Flora cont.</i>	Scrub			Adjoining coppice. Light phase
	1913	1914	1920	
<i>Galium cruciata</i>	—	l.	o.	—
<i>G. erectum</i>	—	r.	—	—
<i>Gentiana amarella</i>	a.	f.	o.—f.	—
<i>Geranium columbinum</i>	+	o.	o.	—
<i>Geum urbanum</i>	—	—	r.	o.
<i>Helianthemum vulgare</i>	+	l.	l.	P.
<i>Hieracium pilosella</i>	a.	a.—l.d.	l.a.	—
<i>Holcus lanatus</i>	+	f.	l.	—
<i>Hypericum hirsutum</i>	+	o.	o.	f.
<i>H. perforatum</i>	a.	f.	f.—l.a.	f.
<i>Inula squarrosa</i>	f.	a.	f.	o.
<i>Lithospermum officinale</i>	+	r.	r.	o.
<i>Leontodon autumnale</i>	+	a.	f.	—
<i>L. hispidum</i>	f.	a.	o.	P.
<i>Linum catharticum</i>	+	o.	o.	—
<i>Lotus corniculatus</i>	+	o.	o.	P.
<i>Luzula campestris</i>	—	o.	l.	—
<i>Mentha arvensis</i>	—	r.	o.	—
<i>Mercurialis perennis</i>	+	r.	—	l.a.
<i>Myosotis arvensis</i>	—	—	l.	—
[<i>Nepeta hederacea</i>	—	—	—	o.
<i>Ophrys apifera</i>	—	r.	—	—
<i>Origanum vulgare</i>	a.	a.—s.	v.a.—l.d.	a.—l.d.
<i>Pastinaca sativa</i>	+	l.a.	l.a.	o.
<i>Phleum pratense</i>	+	—	—	—
<i>Poa annua</i>	—	—	r.	—
[<i>P. trivialis</i>	—	—	—	o.
<i>Polygala vulgaris</i>	+	o.	o.	—
<i>Potentilla anserina</i>	+	l.a.	o.	P.
<i>P. reptans</i>	+	f.—l.a.	f.	P.
<i>P. sterilis</i>	+	—	r.	—
<i>Poterium sanguisorba</i>	f.	f.	l.a.	P.
<i>Primula veris</i>	+	l.	o.	o.
<i>P. vulgaris</i>	—	—	r.	o.
<i>Prunella vulgaris</i>	—	o.	o.	o.
[<i>Pteridium aquilinum</i>	—	—	—	l.
<i>Pulicaria dysenterica</i>	+	l.	l.	—
<i>Ranunculus bulbosus</i>	—	o.	o.	—
<i>R. repens</i>	—	o.	—	o.
<i>Rumex crispus</i>	+	r.	r.	—
<i>Sanicula europaea</i>	+	r.	—	l.a.
<i>Scabiosa arvensis</i>	—	o.	o.	—
<i>Sc. succisa</i>	—	l.	—	P.
<i>Scrophularia nodosa</i>	+	o.	o.	o.
<i>Senecio jacobaea</i>	+	o.	o.	o.
<i>S. erucifolius</i>	—	r.	—	—
[<i>Solanum dulcamara</i>	—	—	—	o.
<i>Sonchus oleraceus</i>	+	r.	r.	—
[<i>Tamus communis</i>	—	—	—	o.
<i>Taraxacum officinale</i>	—	o.	—	—
<i>Teucrium scorodonia</i>	—	r.	—	—
<i>Thymus serpyllum</i>	a.	a.	l.a.	P.
<i>Trifolium pratense</i>	—	o.	—	—
[<i>Trisetum flavescens</i>	—	—	—	o.
<i>Tussilago farfara</i>	—	r.	—	—
<i>Verbascum thapsus</i>	—	r.	—	o.
<i>V. nigrum</i>	+	o.	o.	—
<i>Veronica arvensis</i>	—	r.	l.	—
<i>V. chamaedrys</i>	+	o.	o.	o.
<i>V. officinalis</i>	+	o.	o.	o.
<i>V. serpyllifolia</i>	—	—	o.	P.
<i>Viola hirta</i>	a.	a.	a.	l.a.
[<i>V. odorata</i>	—	—	—	o.
<i>V. riviniana</i>	+	a.	a.	a.
<i>V. silvestris</i>	—	o.	l.	o.

<i>Bryophytes:</i>	Scrub			Adjoining copice. Light phase
	1913 ¹	1914	1920	
[<i>Anomodon viticulosus</i> ...	—	—	—	r.
<i>Barbula fallax</i> ...	—	—	l.	—
[<i>B. unguiculata</i> ...	—	—	—	o.
<i>Brachythecium purum</i> ...	—	f.	f.	o.
<i>B. rutabulum</i> ...	—	r.	o.	o.
<i>Camptothecium lutescens</i> ...	+	a.	a.—l.d.	o.
<i>Eurhynchium striatum</i> ...	—	—	o.	—
<i>Fissidens taxifolius</i> ...	—	o.	o.	r.
<i>Hylocomium triquetrum</i> ...	+	a.	a.—l.d.	o.
<i>Hypnum chrysophyllum</i> ...	—	a.	a.—l.d.	—
[<i>H. cupressiforme</i> ...	—	—	—	f.
<i>H. molluscum</i> ...	—	—	l.a.	—
[<i>Thuidium tamariscinum</i> ...	—	—	—	o.

The ground flora of this area consists of a varied collection of species, no single one of which can be called dominant. Over considerable stretches mosses are much the most abundant ground plants: *Camptothecium lutescens* and *Hypnum chrysophyllum* on the open parts, and *Hylocomium triquetrum* in the more shaded spots where the bushes are closer.

The flowering plants are for the most part species of open spaces and wood edges with some grassland species. Comparatively few shade woodland species are recorded: of these the following are the most noteworthy (the dates on which they were recorded are added):

<i>Ajuga reptans</i>	1913	—	1920	<i>Mercurialis perennis</i>	1913	1914	—
<i>Carex silvatica</i>	1913	1914	1920	<i>Potentilla sterilis</i>	1913	—	1920
<i>Epilobium montanum</i>	1913	1914	1920	<i>Primula vulgaris</i>	—	—	1920
<i>Euphorbia amygdaloides</i>	—	—	1920	<i>Sanicula europaea</i>	1913	1914	—
<i>Fragaria vesca</i>	1913	1914	1920	<i>Teucrium scorodonia</i>	—	1914	—
<i>Geum urbanum</i>	—	—	1920	<i>Viola riviniana</i>	1913	1914	1920
<i>Hypericum hirsutum</i>	1913	1914	1920				

Comparison of this area in 1914 and after an interval of six years in 1920, showed a rather surprisingly small amount of change. The bushes had grown somewhat and the closed thickets were slightly more extensive, but much less than might have been expected. An explanation seems to lie in the fact that during the interval a considerable increase in the number of rabbits had occurred. In 1920 many of the bushes and especially the younger ones were eaten off, and rabbit tracks through the area were much more abundant than at the earlier periods.

A quadrat laid down and charted in 1914 was recharted in 1920 (Figs. 10 and 11) but only comparatively small differences were observable. Many small *Cornus* plants had become more bushy, but no higher, owing to rabbit attack. It will be seen that of the 47 species of flowering plants present in 1914 seven had disappeared in 1920 and only one new species (*Ajuga reptans*) had appeared. In nearly all these cases however the species are represented by single individuals only. *Peucedanum sativum* and *Veronica serpyllifolia*, each

¹ The Bryophytes were not fully recorded in 1913.

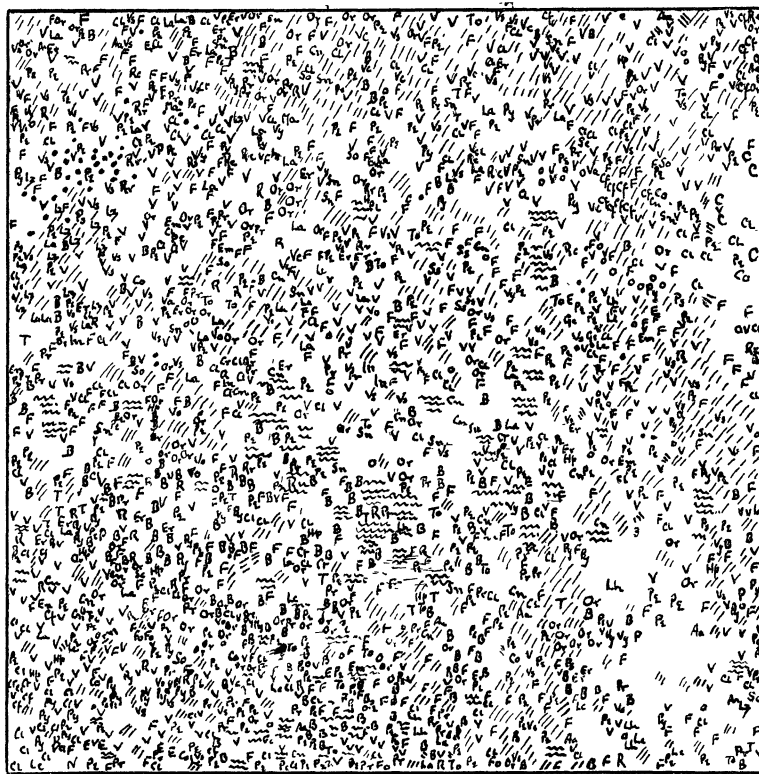


FIG. 10.

FIGS. 10 and 11. Quadrat charts between shrubs (scale 1 : 10) of the same square metre in the developing phase of transition coppice. Fig. 10, 31 Aug. 1914; Fig. 11, 12 Sept. 1920.

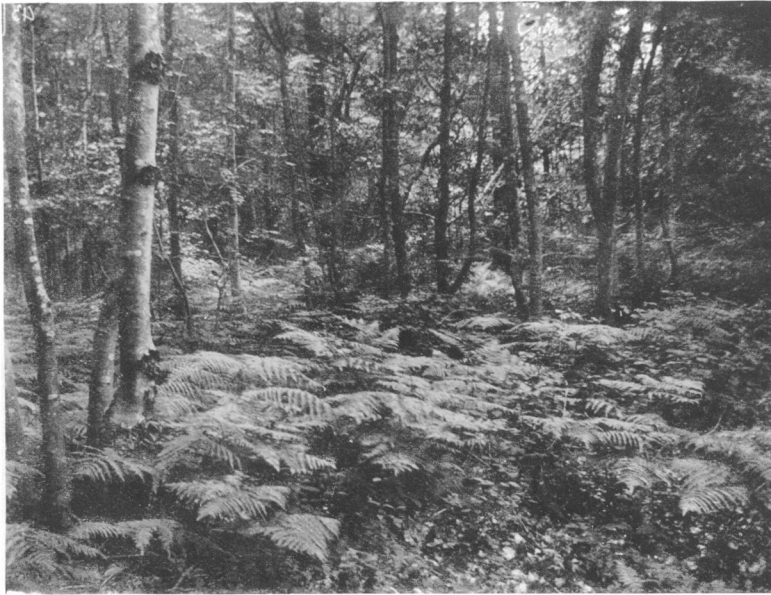
	Symbol	1914	1920		Symbol	1914	1920
Anagallis arvensis	Aa	10	6	Festuca ovina	Fo	5	1
Ajuga reptans	Aj	—	1	Fragaria vesca	F	278	46
Bellis perennis	B	145	54	Geranium columbinum	Ge	2	1
Calamintha acinos	Ca	1	—	Hypericum perforatum	Hp	6	19
Carex flacca	Cf	17	92	Inula squarrosa	In	4	2
Centaurea scabiosa	Cn	9	4	Leontodon autumnale	La	30	27
Cerastium triviale	Ct	4	4	L. hispidum	Lh	7	18
Cirsium acaule	C	5	6	Linum catharticum	Lc	8	3
Clinopodium vulgare	Cl	99	119	Luzula campestris	Lz	14	13
Cornus sanguinea	Co	7	8	Mentha arvensis	Ma	1	—
Epilobium montanum	Em	4	—	Myosotis arvensis	My	1	—
Erythraea centaurium	Er	18	13	Origanum vulgare	Or	93	153
Euphrasia nemorosa	E	6	1	Peucedanum sativum	Ps	8	—
Euphorbia exigua	Ee	1	1	Plantago lanceolata	Pl	4	1

represented by eight individuals, and *Epilobium montanum* by four individuals in 1914 were not found in 1920.

The total number of individuals of all species (excluding mosses) was 1528 in 1914 and 1163 in 1920. The most striking decreases in the numbers of individual species are *Fragaria vesca* which dropped from 278 to 46, *Potentilla reptans* from 156 to 48, *Bellis perennis* from 145 to 54: less striking but probably significant decreases are shown by *Euphrasia nemorosa* (6 to 1), *Festuca ovina* (5 to 1), *Linum catharticum* (8 to 3), *Plantago lanceolata* (4 to 1), *Viola hirta* (377 to 317) and *Viola riviniana* (40 to 22). The most striking increases are seen in *Carex flacca* (17 to 92), *Origanum vulgare* (93 to 153), *Ranunculus bulbosus* (19 to 52). The mosses changed very little. *Hypnum chrysophyllum* diminished in some places but on the whole had rather increased locally, while *Hypnum molluscum* appeared. There was more bare soil in 1920 than in 1914, especially on the right-hand half of the area.

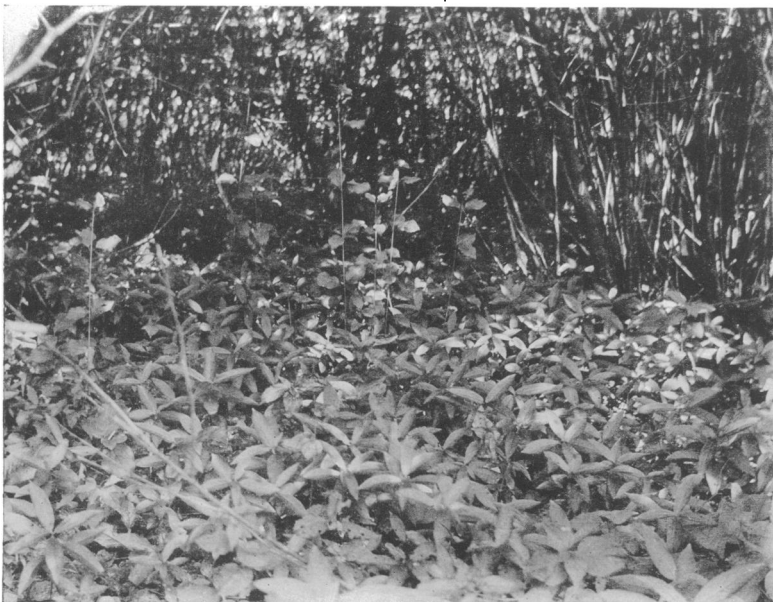
It is obvious that these changes do not represent progress towards a woodland ground vegetation. No single genuine woodland species increased while *Fragaria vesca* and *Viola riviniana* decreased. On the other hand certain grassland (*Festuca ovina*, *Linum catharticum*) and open soil species (*Potentilla reptans*) also decreased, while others increased (*Carex flacca*, *Origanum vulgare*, *Ranunculus bulbosus*). These changes and also those shown by the general lists (pp. 173-5) suggest increased dryness as well as increased rabbit attack. Both factors would tell against increase of woodland species, while the two together would select for ecesis the species able to colonize dry soil and on the whole avoided by rabbits. The meteorological records show that the rainfall of the six years' interval was about the average, but very unevenly distributed. The growing season of 1919 and the early part of 1920 were exceptionally dry.

A comparison of the flora with that of the transition coppice which presumably originally occupied the ground is interesting. Of the shrubs three are present here that have not been seen in the coppices: *Rhamnus catharticus*, *Salix cinerea* and *Viburnum opulus*. Of the 104 herbaceous plants and mosses no fewer than 76 have been recorded either in transition coppices or on pathways through them. The scrub is an example of an exactly parallel succession in the recolonization of cleared woodland, to that described for chalk soil at Oakham Bottom. *Cornus sanguinea* is again the pioneer shrub, here associated with *Viburnum lantana*. The slowness with which *Fraxinus* is entering is in contrast with the rapidity of its invasion on chalk slopes. On this soil *Corylus* is a much more progressive colonizer.



Phot. R. S. A. June 1912

FIG. 1. "Transition Coppice"—shade phase, with *Fraxinus excelsior* dominant and a ground society of *Pteridium aquilinum*. Edge of plateau.



Phot. R. S. A. Sept. 1913

FIG. 2. Oak-hazel coppice—shade phase, with *Corylus avellana* dominant and ground society of *Mercurialis perennis*. Shoots of *Euonymus europaeus* (centre and left). Inwood Copse.

ADAMSON—WOODLANDS OF DITCHAM PARK