THE DISTRIBUTION OF BRYOPHYTES IN THE
WOODLANDS OF SOMERSET.

BY W. WATSON.

THE county of Somerset has a most interesting flora, the richness of which is due to a number of causes; prominent amongst these are the mild climate, well-wooded character, variability of rainfall, diversity of physical and geological aspects, and last, but not least, the comparative immunity from the smoke of manufacturing and thickly populated districts. The geology of the county is very complicated, every system from the Old Red Sandstone to recent deposits being represented, giving rise to great variability in its soils and physical geography, the peat moors and alluvial flats of the Sedgemoor area forming a sharp contrast with the Carboniferous limestone of the Mendips, whilst the alternation of Jurassic clays and limestones give rise to the characteristic undulations of the eastern portion.

The woodlands are well represented by the oak and ash-types. In the former the oak is the dominant tree, the ash being confined to damp situations. Oak woods, of the character of many of those met with on the clays of the south-east of England are seldom seen, but the oak-woods of the Upper Greensand of the eastern boundary of Somerset are quite comparable with those on the sandy soils of other parts of the country. The ash-woods are dominated by the ash, the oak occupying a similar subordinate position as the ash does in the oak-woods. The woods of the ash-type are very variable in character, elimination of the ash and its replacement by hazel often giving rise to a derived form of woodland, which is well represented in Somerset. These woods have been called oak-hazel-woods¹, the oak and the hazel being the dominant woody plants, while ash standards are of infrequent occurrence. As these oak-hazel-woods are so characteristic a feature of the county I have considered it advisable to retain the term for local use, though they have little in common with the oak-hazel coppices of the south-east of England, these being undoubtedly offshoots from the lowland oak-woods. In some of the woods the transition from the ash-type to the oak-hazel form are very striking, recurring again and again in the course of a few miles.

¹ C. E. Moss. Geographical Distribution of Vegetation in Somerset, Royal Geogr. Soc., 1906.

In extreme cases these three woodland associations are well differentiated, but transitions occur which are difficult to refer to any one of the types. The oak-hazel-woods are usually found at low elevations on the Triassic and Jurassic marls and clays, the oak-woods at higher elevations on the sandstones, whilst the ash-woods are especially characteristic of the slopes of the Carboniferous limestone. Dr. Moss, in his "Geographical Distribution of Vegetation in Somerset," has shown that each of these woodland types has its characteristic association of Phanerogams and Vascular Cryptogams, and I am in agreement with the general results of his careful investigations, the interesting exposition of which has earned him the thanks of Somerset botanists.

Native beech-woods are probably absent; the rings of beech trees which are so conspicuous a feature around the woods near Minehead, Taunton and Alfred's Tower have probably been planted. At Norton Fitzwarren, near Taunton, there is a small wood which almost entirely consists of beech trees, with their characteristic lack of undergrowth, but these trees also are probably planted. Extensive planting of trees has taken place, so that a large number of woods cannot be referred to any of the types; Dr. Moss refers to these as "mixed woods," an interesting case of which occurs near Yatton.

In all these woods, except where beeches are dominant, the lower forms of plant-life are abundant, bryophytes clothing the ground with a mantle of various hues, whilst the trees are draped with lichens. The commonest species¹ of the latter are *Collema flaccidum*, *Calicium hyperellum*, *Ramalina calicaris*, *R. fraxinea*, with its variety *ampliata*, *R. fastigiata*, *R. farinacea*, *R. pollinaria*, *Usnea florida*, *U. hirta*, *Evernia prunastri*, *Parmelia saxatilis* with its form *furfuracea*, *P. caperata*, *P. physodes*, *P. pulverulenta*, *P. tenella*, *Lecanora subfusca*, *L. rugosa*, *Pertusaria amara*, *P. globulifera*, *P. communis*, *P. Wulfenii*, *Lecidea canescens*, *Graphis scripta*, *Cladonia pyxidata*, *C. pungens*, *C. macilenta*, *C. pityrea*, *C. squamosa* and *Cladina sylvatica*. The lichens seem to be more susceptible than the bryophytes to the influence of man, disappearing near the towns at a more rapid rate, though *Collema cheileum* appears to be an exception to this rule.

The commonest and most prominent mosses are pleurocarpous, whilst the chief liverworts belong to the Jungermanniaceæ.

The upland ash-woods are characterised by the abundance of

¹ Names according to Crombie's Monograph of British Lichens.

saxicolous forms, the oak-woods by those bryophytes which prefer a sandy or a peaty soil, whilst in the oak-hazel-woods plants preferring a stiff soil are found. The amount of moisture present in these woods varies, but, as a rule, the oak-hazel-coppice has the greatest amount; the woods of the oak-type are of a fairly dry character, especially in upland situations, whilst the ash-woods of the uplands are the driest, those of the lower elevations approaching more closely to the oak-hazel in this respect.

The following lists are useful for comparing the different associations. The naming of the species in all cases is taken from the Census Catalogues of the Moss Exchange Club¹.

(1). The following species are abundant in all the three types of woods:—*Catharinea undulata*, *Dicranum scoparium*, *Mnium undulatum*, *Neckera complanata*, *Porotrichum alopecurum*, *Thuidium tamariscinum*, *Brachythecium rutabulum*, *Eurynchium striatum*, *Plagiothecium silvaticum*, *Hypnum cupressiforme* and its varieties *filiforme* and *ericetorum*, *Plagiochila asplenoides* and *Lophocolea cuspidata*.

(2). In the ash and oak-hazel-woods the following species, which are absent or of less frequent occurrence in the oak-woods, are found:—*Hypnum molluscum*, *H. cuspidatum*, *Eurynchium rusci-forme*, *Camptothecium sericeum*, *Anomodon viticulosus*, *Mnium stellare*, *Bryum capillare* (ground form), *Encalypta streptocarpa*, *Fissidens viridulus* and *Radula complanata*.

(3). The following species are characteristic of the ash-woods:—*Hypnum molluscum* (dominant), *H. cuspidatum*, *Eurynchium striatum* (sub-dominant), *Camptothecium sericeum*, *Anomodon viticulosus*, *Mnium punctatum*, *M. affine*, *M. cuspidatum*, *Bryum capillare*, *Encalypta streptocarpa*, *Fissidens adiantoides* (a ground form) and *Metzgeria furcata*. In the ash-woods of the Carboniferous limestone, saxicolous species such as *Neckera crispa*, *Orthotrichum anomalum* var. *saxatile*, *Trichostomum nitidum*, *Ditrichum flexicaule*, *Grimmia apocarpa*, *Barbula rubella*, *Madotheca platyphylla* and *Frullania Tamarisci*, in addition to the above species, are common.

(4). The following species are characteristic of the oak-woods:—*Catharinea undulata* (sub-dominant), *Tetraphis pellucida*, *Polytrichum aloides*, *P. piliferum* (sub-dominant when conifers are abundant), *P. juniperinum*, *Dicranum majus*, *Orthotrichum Lyellii*, *Webera albicans*, *Mnium cuspidatum*, *M. hornum* (sub-dominant), *Campylopus pyriformis*, *C. fragilis*, *Leucobryum glaucum*, *Aulacomnium androgynum*, *Plagio-*

¹ The Census Catalogue of British Mosses. York, 1907.

Lett's Catalogue of British Hepatics. Eastbourne, 1904.

thecium undulatum, *Hypnum Schreberi*, *Pellia epiphylla*, *Nardia scalaris*, *Lophozia ventricosa*, *Lophocolea bidentata*, *Kantia Sprengelii*, *Diplophyllum albicans*, *Scapania compacta* and *Frullania dilatata*.

(5). The following species are characteristic of the oak-hazel woods:—*Fissidens taxifolius*, *F. bryoides*, *Mnium undulatum* (sub-dominant), *Brachythecium rutabulum* (dominant), *Eurynchium prælongum* (sub-dominant), *Webera carnea*, *Mnium stellare*, *Brachythecium rivulare*, *B. velutinum*, *Eurynchium myurum*, *E. rusciforme*, *Amblystegium filicinum*, *Hypnum riparium*, *H. commutatum*, *Conocephalum conicum*, *Lunularia cruciata*, *Pellia endiviæfolia*, *Kantia Trichomanis*, and *Radula complanata*.

Most of these species are also common in the damper ash-woods and in the woods intermediate between the ash-type and the oak-hazel form.

(6). In the beech-woods there are comparatively few bryophytes, the chief forms being *Fissidens taxifolius*, *F. bryoides*, *Mnium undulatum*, *Brachythecium rutabulum*, *Eurynchium prælongum*, *Hypnum cupressiforme* with its varieties *resupinatum* and *ericetorum*, and *Frullania dilatata*, the latter being sub-dominant.

(7). The mixed woods vary to a large extent, but their bryophytes are generally similar to those of the oak-hazel association.

(8). Where pines are common in the oak-woods, the various species of *Polytrichum*, *Tetraphis pellucida*, *Leucobryum glaucum*, *Aulacomnium androgynum*, *Campylopus fragilis*, *C. pyriformis*, *Plagiothecium undulatum*, *Diplophyllum albicans*, *Nardia scalaris*, *Scapania ventricosa*, and *S. compacta* become more abundant.

(9). Many species which are absent or infrequent in ash and oak-hazel are common in the oak-woods.

The following list does not pretend to be a complete representation of bryophytic distribution in the woods, as so many minute species are liable to be overlooked. The plan adopted is the same as that in the "Geographical Distribution of Vegetation in Somerset," the letters in the various columns denoting the frequency, d=dominant, s=sub-dominant, a=abundant, o=occasional, r=infrequent or rare, vr=very rare, —=absent.

				Oak.	Oak Hazel.	Ash.
<i>Sphagnum subsecundum</i> , Nees.	...	...	...	o	r	—
<i>Tetraphis pellucida</i> , Hedw.	...	...	...	o	vr	vr
<i>Catharinea undulata</i> , W. and M.	...	...	...	s	a	a
<i>Polytrichum aloides</i> , Hedw.	...	...	...	a	—	—
„ <i>piliferum</i> , Schreb.	...	...	...	a	—	—

				Oak.	Oak Hazel.	Ash.
<i>Polytrichum juniperinum</i> , Willd.	...	...	...	a	r	r
„ <i>gracile</i> , Dicks.	...	...	...	o	r	r
„ <i>formosum</i> , Hedw.	...	...	...	o	o	o
<i>Ceratodon purpureus</i> , Brid.	...	...	...	a	o	o
<i>Ditrichum flexicaule</i> , Hampe.	...	...	...	—	vr	a
<i>Dichodontium pellucidum</i> , Schp.	...	...	...	o	—	—
<i>Dicranella heteromalla</i> , Schp.	...	...	...	a	o	o
„ <i>varia</i> , Schp.	...	...	...	vr	o	r
<i>Dicranoweisia cirrata</i> , Lindb.	...	...	...	o	o	o
<i>Campylopus pyriformis</i> , Brid.	...	...	...	o	vr	vr
„ <i>fragilis</i> , B. and S.	...	...	...	o	vr	vr
<i>Dicranum scoparium</i> , Hedw.	...	...	...	a	a	a
„ „ var. <i>orthophyllum</i> , Brid.	...	...	...	o	o	o
„ <i>majus</i> , Turn.	...	...	...	a	r	r
<i>Leucobryum glaucum</i> , Schp.	...	...	...	o	vr	vr
<i>Fissidens exilis</i> , Hedw.	...	...	...	r	r	—
„ <i>viridulus</i> , Wahl.	...	...	...	—	o	o
„ <i>adiantoides</i> , Hedw.	...	...	...	—	—	a
„ <i>bryoides</i> , Hedw.	...	...	...	o	a	o
„ „ var. <i>inconstans</i> , Schp.	...	...	...	—	o	—
„ <i>taxifolius</i> , Hedw.	...	...	...	o	a	o
<i>Grimmia apocarpa</i> , Hedw.	...	...	...	o	r	a
<i>Tortula muralis</i> , Hedw.	...	...	...	r	r	o
„ <i>lævipila</i> , Schwaeg.	...	...	...	o	o	—
<i>Barbula rubella</i> , Mitt.	...	...	...	r	r	a
„ <i>fallax</i> , Hedw.	...	...	...	o	o	a
„ <i>unguiculata</i> , Hedw.	...	...	...	r	r	o
<i>Trichostomum crispulum</i> , Bruch.	...	...	...	—	r	o
„ <i>nitidum</i> , Schp.	...	...	...	—	vr	o
<i>Encalypta streptocarpa</i> , Hedw.	...	...	...	r	o	o
<i>Ulotia crispa</i> , Brid.	...	...	...	o	o	o
„ „ var. <i>intermedia</i> , Braithw.	...	...	...	o	o	o
<i>Orthotrichum anomalum</i> , Hedw. var. <i>saxatile</i> , Milde	...	...	...	r	r	o
„ <i>Lyellii</i> , Hook and Tayl.	...	...	...	a	o	o
„ <i>affine</i> , Schrad.	...	...	...	o	o	a
<i>Anulacomnium androgynum</i> , Schwaeg.	...	...	...	o	vr	vr
<i>Webera nutans</i> , Hedw.	...	...	...	o	r	vr
„ <i>carnea</i> , Schp.	...	...	...	—	a	—
„ <i>albicans</i> , Schp.	...	...	...	a	o	—
<i>Bryum capillare</i> , L.	...	...	...	o	a	a

					Oak.	Oak Hazel.	Ash.
<i>Mnium affine</i> , Bland	...	...	...	...	o	r	a
„ <i>cuspidatum</i> , Hedw.	...	...	...	...	a	o	a
„ <i>rostratum</i> , Schrad.	...	...	...	...	o	o	o
„ <i>undulatum</i> , L.	...	...	...	...	a	s	a
„ <i>hornum</i> , L.	...	...	...	...	s	r	a
„ <i>stellare</i> , Reich.	...	...	...	...	r	o	o
„ <i>punctatum</i> , L.	...	...	...	...	o	o	a
<i>Neckera crispa</i> , Hedw.	...	...	...	...	—	vr	a
„ <i>complanata</i> , Hübner	...	...	...	...	a	a	a
<i>Pterygophyllum lucens</i> , Brid.	...	...	...	...	—	o	—
<i>Porotrichum alopecurum</i> , Mitt.	...	...	...	...	a	a	a
<i>Anomodon viticulosus</i> , H. and T.	...	...	...	...	r	o	a
<i>Thuidium tamariscinum</i> , B. and S.	...	...	...	...	a	a	a
<i>Camptothecium sericeum</i> , Kindb.	...	...	...	...	r	r	a
<i>Brachythecium rutabulum</i> , B. and S.	...	...	...	...	a	d	a
„ <i>rivulare</i> , B. and S.	...	...	...	...	—	o	o
„ <i>velutinum</i> , B. and S.	...	...	...	...	o	a	o
„ <i>illecebrum</i> , De Not.	...	...	...	...	o	—	—
„ <i>purum</i> , Dixon	...	...	...	...	a	o	o
<i>Eurynchium piliferum</i> , B. and S.	...	...	...	...	—	o	—
„ <i>crassinervium</i> , B. and S.	...	...	...	...	—	r	o
„ <i>prælongum</i> , Hobk.	...	...	...	...	a	s	a
„ <i>myosuroides</i> , Schp.	...	...	...	...	o	o	—
„ <i>myurum</i> , Dixon	...	...	...	...	o	o	—
„ <i>striatum</i> , B. and S.	...	...	...	...	a	a	s
„ <i>striatulum</i> , B. and S.	...	...	...	...	—	—	o
„ <i>rusciforme</i> , Milde	...	...	...	...	r	o	o
<i>Plagiothecium elegans</i> , Sull.	...	...	...	...	o	r	o
„ <i>denticulatum</i> , B. and S.	...	...	...	...	a	o	a
„ <i>silvaticum</i> , B. and S.	...	...	...	...	a	a	a
„ <i>undulatum</i> , B. and S.	...	...	...	...	a	vr	vr
<i>Amblystegium serpens</i> , B. and S.	...	...	...	...	o	o	o
„ <i>filicinum</i> , De Not.	...	...	...	...	—	o	—
<i>Hypnum riparium</i> , L.	...	...	...	...	—	o	—
„ <i>cupressiforme</i> , L.	...	...	...	...	a	a	a
„ „ var. <i>resupinatum</i> , Schp.	...	...	...	...	a	a	o
„ „ „ <i>filiforme</i> , Brid.	...	...	...	...	a	a	a
„ „ „ <i>ericetorum</i> , B. and S.	...	...	...	...	a	a	a
„ <i>commutatum</i> , Hedw.	...	...	...	...	—	o	—
„ <i>Patientiæ</i> , Lindb.	...	...	...	...	—	o	—

				Oak.	Oak Hazel.	Ash.
<i>Hypnum molluscum</i> , Hedw.	...	...	...	o	o	d
„ <i>cuspidatum</i> , L.	...	...	...	o	a	a
„ <i>Schreberi</i> , Willd.	...	...	...	a	o	o
<i>Hylocomium splendens</i> , B. and S.	...	...	...	a	o	o
„ <i>squarrosus</i> , B. and S.	...	...	...	a	o	o
„ <i>triquetrum</i> , B. and S....	...	...	...	a	a	a
<i>Conocephalum conicum</i> , (L.), Dum....	...	...	...	r	a	r
<i>Lunularia cruciata</i> , (L.), Dum.	...	...	...	r	a	r
<i>Metzgeria furcata</i> , (L.), Lindb.	...	...	...	o	o	a
<i>Pellia epiphylla</i> , (L.), Dum.	...	...	...	o	r	r
„ <i>endiviæfolia</i> , (Dicks), Dum....	...	...	...	r	a	o
<i>Nardia scalaris</i> , (Schrad.), Gray	...	...	...	a	r	r
<i>Lophozia turbinata</i> , (Raddi.), Steph.	...	...	...	—	o	—
„ <i>ventricosa</i> , (Dicks), Dum.	...	...	...	o	vr	vr
<i>Plagiochila asplenoides</i> , (L.), Dum.	...	...	...	a	a	a
<i>Lophocolea bidentata</i> , (L.), Dum.	...	...	...	o	r	r
„ <i>cuspidata</i> , Limpr.	...	...	...	a	a	a
„ „ var. <i>alata</i> , Mitt.	...	...	...	—	o	—
„ <i>heterophylla</i> , (Schrad.), Dum....	...	...	...	o	—	—
„ „ var. <i>laxior</i> , Nees.	...	...	...	o	—	—
<i>Saccogyna viticulosa</i> , (Sm.), Dum....	...	...	...	—	o	o
<i>Cephalozia bicuspidata</i> , (L.), Dum....	...	...	...	a	a	a
<i>Kantia Trichomanis</i> , (L.), Gray	...	...	...	o	a	—
„ <i>Sprengelii</i> , (Mart.), Pears....	...	...	...	a	o	—
<i>Trichocolea tomentella</i> , (Ehrh.), Dum.	...	...	...	—	o	—
<i>Diplophyllum albicans</i> , (L.), Dum....	...	...	...	a	r	r
<i>Scapania compacta</i> , (Roth.), Dum....	...	...	...	o	vr	vr
<i>Radula complanata</i> , (L.), Dum.	...	...	...	r	o	o
<i>Madotheca platyphylla</i> , (L.), Dum....	...	...	...	r	r	a
<i>Frullania Tamarisci</i> , (L.), Dum.	...	...	...	—	—	o
„ <i>dilitata</i> , (L.), Dum.	...	...	...	o	o	o
<i>Lejeunea cavifolia</i> , (Ehrh.), Lindb....	...	...	...	—	—	o

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