LICHEN SURVEY OF MOCCAS PARK NNR
HEREFORDSHIRE
2018

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For Plantlife

BACK FROM THE BRINK

British Lichen Society

LICHEN SURVEY OF MOCCAS PARK NNR HEREFORDSHIRE, 2018

Contents

Cover Photograph: **Photo 2018-05-17-04**. The mid slope habitat, open parkland below grading to more heavily treed pasture woodland above. This area is the richest in the park, supporting both specialist lichens of open field trees and old growth woodland

Acknowledgements: thanks to all at the meeting, Mark Powell my fellow leader, Steve Price and Dave Lamacraft for organising the meeting and to the Natural England warden Bob Silverwood for welcoming us to the NNR.

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1.0 INTRODUCTION

1.1 Background & Brief

1.1.1 Background

Moccas Park is an ancient deer park lying on the northern flanks of a steep ridge known as Dorstone Hill overlooking the River Wye. It described as is one of the largest and most diverse examples of wood pasture remaining in Britain in the SSSI citation. The lichen assemblage was known to include species of interest, with 227 taxa recorded up to 2002. However, the park had clearly been negatively impacted by past acidifying pollution and the overall known conservation value was lower than pollution resistant veteran tree groups such as beetles.

Although considerable lichen interest had been recorded from the NNR, and there had been some monitoring work on rare species, there had been no detailed and extensive survey since the 1988 survey by Ken Sandell and Mike Gosling.

1.1.2 Brief

As part of the Back from the Brink, Ancients of the Future project Plantlife requested that the British Lichen Society carry out a lichen survey of Moccas Park NNR over a two-day meeting. This was intended to update the knowledge of the lichen assemblage of the NNR, concentrating on the veteran tree habitat, but examining other lichen habitats as well. As well as recoding and mapping the lichen interest, advice on the conservation value of the NNR for lichens and any observations on management were requested.

2.0 METHODS

2.1 Survey Methods

2.1.1 Timing, Conditions & Personnel

The survey was carried out between the 16th and 17th May 2018. The weather was dry throughout, mainly overcast on the first day but sunny on the second. Conditions were good for lichen survey throughout.

The meeting was attended by 16 people, with Mark Powell and Neil A. Sanderson leading the lichen recording. Those attending were:

Paul Cannon
Nicola Bacciu
Juliet Bailey
Heather Colls
Graham Boswell
Shirley Hancock
David J Hill
Alastair Hotchkiss
Geof Howe
Dave Lamacraft
Mark Powell
Maxine Putnam
Neil A Sanderson
Paula Shipway
Tim Wilkins
Ray Woods

2.1.2 Areas Surveyed

The survey route taken by Neil Sanderson is shown on an OS map base (**Map 1**) as derived from the track logs of a GPS receiver. This shows the general area surveyed only, as other people ranged off this route.

In the time available it was not possible to visit all of the park. The survey strategy was to make transects across the park taking in both known areas of interest and examples of the main habitats within the park. The woodland at the very top of the wood was not visited, but this is unlikely to be of high interest for lichens.

2.1.3 Recording Trees of Interest

The locations of trees particular interest supporting rare species which were recorded systematically (see section **2.1.4** for definition) were located by Neil Sanderson as waypoints using a Garmin GPSmap 64s (**Maps 1 – 40**). The waypoint was recorded when the indicated was about ± 5m or less. Where the interest was very concentrated, with frequent trees of interest, about 10m separation was maintained between waypoints. Some trees of interest were recorded separately by other members of the survey team.

The codes used for the waypoints were MO and then a sequential waymark number, e.g. MO001 etc. The data on the GPS recorder was downloaded to Garmin BaseMap software and manipulated in this software. The final data was then exported as GPX files to MapGPS Pro, which allows the mapping of GPS data onto raster format maps.

For each tree recorded, the tree species, physiological age and habitat was noted.

2.1.4 Species Recording

All epiphytic lichen species and associated fungi visible from the ground were recorded (**Annex 2**). As such the concentration was on the lower trunk habitats, especially on older trees and bushes, particularly in sheltered areas; the typical habitat of species of conservation interest. Habitats that contribute considerably to the lichen diversity, but are normally dominated by commonplace species, such as twigs and branches, inevitably were not so closely examined. As a result, the species list produced will not be complete but epiphytic species of nature conservation interest will have been more thoroughly recorded. Work in Sweden has shown that surveying the bottom 2m of trunks of the fallen trees only recorded about a quarter of the lichens species of conservation interest on the whole trunk (Fritz, 2009). However, he found that most the missed species of interest could be found within 2m of the ground on other trees within the site if an extensive survey was carried out. This indicates that extensive ground based surveys will be likely to adequately sample the total flora of lichens of conservation interest, but could significantly under estimate populations numbers.

Twigs are rapidly colonised by highly mobile species and this can be informative. The composition of the lichen assemblage on the twigs gives an indication of the recent air chemistry, which is not confused by residual effects of past pollution as can occur on trunks (Wolseley et al, 2006). Oak is the best species to observe this, both because of its widespread distribution and its naturally acid bark allows the clear expression of current nitrogen pollution. Where possible the lichen assemblage of Oak twigs was checked to estimate current air pollution levels.

A selection of species, which included all national Threatened or Near Threatened RDB species, the more easily recorded Notable species and some other species of ecological significance, were systematically mapped. It was not possible to systematically record all national Notable species, as some are not easy to record systematically.

All trees with the systematically recorded species were located using a GPS receiver and mapped as a broad brush monitoring exercise (**Maps 2 – 40** & **Annex 1**). For these species the frequency of occurrence was estimated as D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare. In addition, on these trees, all additional species of conservation interest present were also noted.

Systematically Recorded Species:

Species	**Conservation Status**	**Habitats**
Agonimia flabelliformis	Nb (NR)	Woodland Base Rich Bark
Agonimia octospora	NT (NS/IR)	Woodland Base Rich Bark
Arthopyrenia nitescens	Nb (NS/IR)	Parkland Mesic Bark
Bacidia biatorina		Woodland Base Rich Bark
Bacidia incompta	VU (NS/S41)	Wound Track
Bactrospora corticola	Nb (NS)	Dry Bark
Buellia hyperbolica	VU (NR/S41)	Lignum
Calicium salicinum		Dry Bark
Caloplaca lucifuga	VU (NR/S7)	Parkland Mesic Bark
Chaenotheca brunneola		Lignum
Chaenotheca chrysocephala		Dry Bark
Chaenotheca trichialis		Dry Bark
Chaenothecopsis nigra	Nb (NS)	Lignum
Cladonia parasitica		Lignum
Cresponea premnea	Nb (IR)	Dry Bark
Dimerella tavaresiana	Nb (NR)	Parkland Mesic Bark
Gyalecta ulmi	EN (NR/IR/S41)	Wound Track
Lecanographa amylacea/	VU (NS/IR/S41)/	Dry Bark
Buellia violaceofusca	NT (NR/IR/S41)	Dry Bark

Lecanographa lyncea	Nb (IR)	Dry Bark
Lecanora quercicola	VU (NS/IR/S7)	Parkland Mesic Bark
Lecanora sublivescens	NT (NS/IR/S7)	Parkland Mesic Bark
Lecidea nylanderi	Nb (NS)	Lignum
Lecidella sp A	NE (NR)	Parkland Mesic Bark
Leptogium subtile	Nb (NS)	Wound Track
Milospium graphideorum	Nb (NS)	Dry Bark
Ochrolechia arborea	NT (NR)	Lignum
Opegrapha corticola	Nb (IR)	Woodland Base Rich Bark
Pachyphiale carneola		Woodland Base Rich Bark
Pertusaria coronata	Nb (NS)	Parkland Mesic Bark
Porina coralloidea	Nb (NS/IR)	Woodland Base Rich Bark
Protoparmelia oleagina	Nb (NS)	Lignum, Dry Bark
Ramonia dictyospora	NT (NS/IR/S41)	Wound Track
Rinodina exigua	NE	Parkland Mesic Bark
Rinodina roboris var. *robor*is	Nb (IR)	Woodland Base Rich Bark
Sphinctrina turbinata	Nb (NS)	Parkland Mesic Bark
Schismatomma cretaceum	Nb (IR)	Dry Bark
Thelopsis rubella		Woodland Base Rich Bark
Thelotrema lepadinum		Woodland Base Rich Bark

Neil Sanderson's site notes were made on an iPhone in the field and the field notes have been edited and added to the report in **Annex 1**. The species recorded are given in **Species List 1, Annex 2** and the data was converted into a BLS Recorder import spreadsheet to allow importation into the NBN via the BLS database <BLS_General_v6f BLS Moccas NAS.xlsx>. Summaries of species and locations not recorded by Neil Sanderson are also summarised in Annex 1 from notes supplied by the recorders to Neil Sanderson. Mark Powell also wrote up his own notes, which are in a standalone document, attached as in Annex 4.

2.1.5 Trees

The terms used to describe the physiological age of the tree are explained below. These are based on Harding & Alexander (1993):

- Mature: a tree that has reached its full height and is still vigorous, heart rot likely to be absent.
- Post mature: a tree that is no longer vigorous and has started retrenching by branch die back. Heart rot will have commenced but will not be easily visible.
- Ancient: a tree with major branch die back and or extensive and visible heart rot.

The term 'veteran tree' is taken to include both post mature and ancient trees. This classification reflects the natural processes that older trees go through as a response to balancing their increasing size with the photosynthetic area available. The commencement of heart rot indicates the end of the commercial usefulness of timber

2.2 Data Analysis

2.2.1 Nomenclature

The nomenclature mainly follows Woods & Coppins (2012) for lichens and lichenicolous fungi.

Woods & Coppins (2012) and the new Lichens of Great Britain and Ireland (Smith et al, 2009) introduces considerable changes from the previous checklist (Coppins, 2002) and very many from the original edition of the flora (Purvis et al, 1992). The synonyms, and the many more changes to come, can be tracked at the BLS website in their taxon dictionary <http://www.britishlichensociety.org.uk/resources/lichen-taxon-database>.

Many further changes are likely to be applied as modern DNA sequencing elucidates the actual evolutionary relationships between the lichens. Some names of species of interest have been changed recently but were not used in this report:

Old Name	**New Name**
Arthonia pruinata	*Pachnolepia pruinata*
Dimerella tavaresiana	*Coenogonium tavaresianum*
Lecanactis subabietinum	*Inoderma subabietinum*
Lepraria lobificans	*Lepraria finkii*
Leptogium lichenoides	*Scytinium lichenoides*
Leptogium subtile	*Scytinium subtile*
Leptogium teretiusculum	*Scytinium tenuissimum*
Laeviomyces pertusariicola	*Lichenodiplis pertusariicola*
Marchandiomyces aurantiacus	*Erythricium aurantiacum*
Pachyphiale carneola	*Gyalecta carneola*
Pertusaria multipuncta	*Lepra multipuncta*
Schismatomma cretaceum	*Sporodophoron cretaceum*
Schismatomma decolorans	*Dendrographa decolorans*
Syzygospora physciacearum	*Heterocephalacria physciacearum*

2.2.2 Ancient Woodland Indicators

Dr Francis Rose (Rose, 1992 & Coppins & Coppins, 2002a) devised several indicator lists that can be used to assess the diversity and conservation value of woodland epiphytic lichen assemblages in different climatic areas. These replaced an earlier more general indicator list the 'Relative Index of Ecological Continuity' (RIEC) Rose (1976). The indices are ideally applied to about 100ha of woodland. The indices were recently reviewed (Sanderson, 2018a), mainly with the aim of simplifying the application of the indices, by removing multiple choices. The thresholds for considering sites for SSSIs were also reviewed and updated in preparation for the updated SSSI selection criteria for lichens (Sanderson et al, 2018). Some minor changes were also made to the species used. To reflect the changes, the indices were given new and more informative names.

These lists indicate habitat quality; the total number of species found is the important parameter. The indicator species are associated with late succession stands with veteran trees (old growth stands i.e. stands more than 200 years old), especially those stands with a past continuity of old trees (Alexander et al, 2002). Woods that have been clear felled, but regenerated, within the last 200 years (young growth stands) are therefore likely to be poorer in lichen indicator species than less disturbed stands. The lichen ancient woodland indicator lists are different from similar ancient woodland indicator lists composed of vascular plants or bryophytes. The latter reflect ancient sites rather than stands and are much less effected by the management of the trees.

The main appropriate list for the Welsh Marches is the Southern Oceanic Woodland Index (SOWI) (formerly the New Index of Ecological Continuity, SOWI). This is designed for oceanic temperate woodland south of the Scottish Highlands.

The SOWI list consists 85 species and Sanderson (2018a) regarded sites with an index score of 20 or more as being national significance, while sites with scoring more than 30 are regarded to be as likely to be of international significance. Such woods are usually old growth stands with a strong continuity of veteran trees. Below this, as a rough guide, woods with a score of 10 to 19 could be regarded as of county importance and those with a score of 5 to 9 are of high local significance for their woodland lichen assemblage. In this area, it is recommended that a score of 20 is used as the threshold for considering sites for SSSI status (Sanderson et al, 2018).

Also relevant to this site is the Pinhead Index (Sanderson et al, 2018). For this the total number of recorded Pinhead species in the genera *Calicium*, *Chaenotheca*,

Chaenothecopsis, *Microcalicium*, *Mycocalicium* and *Sclerophora* is used as an index score. This index measures the quality of ancient tree and dead wood habitat, sites scoring more than ten are can be regarded as being of national importance and this is also the threshold for considering sites for SSSI status.

2.2.3 Rarity & Threat

The definitions of Red Data Book (RBD) status follows Woods & Coppins (2012), who also added a concept of International Responsibility Species:

- **International Responsibility Species**: this is a new category that recognises that some species are commoner in Britain than elsewhere. They are absent, rare or threatened in the rest of Europe and are thought, on existing data, to have 10% or more of their European or World population in Britain. These could be considered as more important than some Red Data Book species, which are common elsewhere in the world. The significance of these species depends on their actual British and local rarity but special attention needs to be paid to them in management.

The Nationally Rare and Nationally Scarce status in Woods & Coppins (2012) are now out of date and updated assessments were obtained from the BLS web site at <http://www.britishlichensociety.org.uk/resources/lichen-taxon-database>.

Significant populations of threatened species (Vulnerable or higher) or Near Threatened species, which are also International Responsibility species either nationally or within SSSI areas of search can be considered as nationally significant and as potentially notifiable features of an SSSI (Sanderson et al, 2018).

Notable Species: Sanderson (2011 & 2018b) has reviewed the measurement of rarity for species not assessed as threatened, or as Near Threatened, species in the RDB. Many declining lichens or those restricted to vulnerable habitats, which are Nationally Scarce, have now been assessed as Threatened or Near Threatened lichen species. In contrast, several ephemeral Nationally Rare species of ruderal habitats are now assessed as least concern. As such the old Nationally Rare/Nationally Scarce assessment was not thought useful any more. As an alternative Sanderson (2011a) proposed that all species Least Concern or Data Deficient species which were Nationally Rare Nationally Scarce or International Responsibility species be put in a single category "Notable species" (Nb). Sanderson (2018b) reviewed the potential Notable species and excluded those that were clearly under recorded common species or ruderal species of limited conservation interest. This list is given in Sanderson (2018a) and is followed in this report.

Sanderson (2018b) suggested an alternative scoring system to that of Hodgetts (1992) (Threatened, Near Threatened and Notable (TNTN) scoring). The score is calculated as follows:

GB Threatened (CR, EN, VU) – scores 4 points.

GB Near Threatened – scores 2 points.

Notable – scores 1 point.

None of the above – scores nil.

This scoring system can be used in woodland habitats, but is considered less useful than the woodland indices in this habitat and is recommended mainly for habitats lacking suitable habitat indices. It is not adopted by Sanderson et al (2018) as a priority method of assessing woodland. One habitat present at Moccas Park, which is covered by TNTN assemblage scoring, however, is the habitat "old trees of open places", covering well-lit veteran trees in parkland, farmland, waysides and hedgerows. SSSI quality sites are expected to score 16 or more in this habitat (Sanderson et al, 2019). N.B. the ecologically coherent assemblage for the habitat "old

trees of open places", includes only those species strongly associated with the habitat. These include only some of the Threatened, Near Threatened and Notable species recorded at Moccas Park.

Section 41 Species. The former BAP list (Biodiversity Reporting and Information Group, 2007) provided the basis of the lichens listed under Section 42 of the Natural Environment & Rural Communities (NERC) Act 2006. Species on this list are considered to be of "principal importance for conservation of biological diversity in England".

The BAP list was revised (Biodiversity Reporting and Information Group, 2007) and, unlike the earlier list, is a reasonably comprehensive list of those lichen species likely to be under particular stress and amenable to conservation action to reverse this. Conservation of these species is regarded as being an important contribution to Britain's obligations under the Rio Convention on Biodiversity. Collectively, however, the Section 41 species list is not an objective tool for assessing conservation importance, habitat indices, RDB populations and the list of Notable species provide this.

Abbreviations used in the text and tables are listed below:

RDB	= Red Data Book Species, (CR, EN, VU & NT Species)
EN	= Endangered Red Data Book species
VU	= Vulnerable Red Data Book species
NT	= Near Threatened Red Data Book species
DD	= Species listed as Data Deficient in the Red Data Book
Nb	= Notable species (NR, NS, IR or S41 species of conservation interest not RDB NT or higher)
NR	= Nationally Rare
Nb (NS)	= Nationally Scarce regarded by Sanderson (2017b) as being of significant conservation interest
(NS)	= Nationally Scarce lichen not regarded by Sanderson (2017b) as being of significant conservation interest
[NS]	= Nationally Scarce lichenicolous parasite, likely to be very under recorded
IR	= International Responsibility species
S41	= Section 41 species

A Lichen Red Data List for England.
A lichen Red Data List for England, is in initial draft. The differences for the national list lists reflects the high level of threat to many epiphytic species, especially those of the Base Rich Bark Woodland Community (*Lobarion*), which still have strong populations in western Scotland, but are threatened further south. Some species recorded at Moccas Park, which are of Least Concern in the British Red List, are likely to be given at least Near Threatened status in England. Of species found at Moccas Park, the following national Least Concern species are listed as potentially Vulnerable: *Pertusaria coronata* and the following as Near Threatened *Lecanographa lyncea*. The Near Threatened *Gyalecta flotowii* is currently listed as Vulnerable in England.

This draft list was used in the methodology for setting monitoring objectives and in devising mapping categories as it reflects English conservation priorities well, but was not used in any analysis or in the main text due to its first draft status.

2.2.4 Communities

Most lichens species have limited tolerances of bark and habitat conditions. This allows the formation of distinctive communities (James et al, 1977). Simple English names have been invented with the technical names given in brackets.

2.2.5 Mapping the Quality of Lichen Interest

The conservation interest of the lichen flora at the waypoints was assessed and mapped, with different symbols assigned to different levels of interest in Garmin BaseCamp.

Purple: location with systematically recorded British or draft English RDB Vulnerable or higher species.

Red: location with systematically British RDB Near Threatened species.

Blue: location with other systematically recorded British Notable species.

Green: other species of ecological significance

In addition, the distributions of individual lichen communities (**Maps 3 – 7**) and systematically recorded species (**Maps 8 – 40**) were mapped.

2.2.6 Existing Data

The existing lichen data recorded from Moccas Park NNR was exported from the BLS database as an excel spreadsheet <Moccas lichen records.xlsx>. The species recorded are listed in **Annex 2**. Major visits include by Brian Coppins and Francis Rose 1968, Ken Sandell, Mike Gosling and Francis Rose 1986 – 1988, Mike Gosling 1994 and 1996 Oliver Gilbert 1998 and Simon Davey 2002. Bryan Edwards carried out monitoring of rare species in 2003. There are only sparse records of rare species after this date.

2.2.7 Reporting on 2018 Survey

This report summarises the survey results of the 2018 survey and analyses the findings, discussing the conservation value of the lichen assemblage recorded and the management required to maintain and enhance this. Other recorders also made their own notes and these should also be consulted, including "LICHENS AT MOCCAS PARK1.docx" by Mark Powell and "Gyalecta ulmi outcrops v02 SGP.pdf" by Steve Price.

3.0 SURVEY

3.1 Lichen Assemblage

3.1.1 Totals

The combined of lichen and associated fungi species list recorded since 1968 is given in **Species List 1** in **Annex 2**. A total of 301 taxa have been reliably recorded from the SSSI; of these 284 were lichens, 17 lichen parasites and 5 associated non-lichenised fungi. A total of 203 taxa were recorded in 2018, of which a remarkable 60 taxa were new to the NNR, 30 of these were new records to Hereford and one taxa was new to Britain.

Epiphytic species of interest recorded for the SSSI included 22 Southern Oceanic Woodland Index (SOWI) species, of which 19 were recorded in 2018. In addition, one Endangered, five Vulnerable, six Near Threatened and 24 Notable species have been recorded in total. In 2018, all Threatened and Near Threatened were recorded along with 20 Notable species. Nine Section 41 species have been recorded, all of which were seen in 2018. The overall totals listed in **Table 1**.

The 2018 surrey did not record more taxa overall than were recorded the previous surveys, but the measures of lichen biodiversity were all higher in 2018, other than for the single Endangered species. This reflects the concentration of the survey on habitats of highest conservation potential with less effort spent on more commonplace habitats.

Table 1
Total Numbers of Lichens Recorded from Moccas Park NNR 1968 – 2018

Moccas Park NNR Biodiversity Measures	1968-2002	2018	Total
Total taxa	222	203	301
Southern Oceanic Woodland Index	12	19	22
Pinhead Index	7	8	8
Endangered	1	1	1
Vulnerable	3	5	5
Near Threatened	2	6	6
Notable	8	20	24
International Responsibility Species	7	15	16
S41	5	9	9
TNTN Score	28	56	60

It is important to remember that the 2018 survey was not a comprehensive survey of the NNR but a transect through the habitats of the NNR. Further lichen interest certainly occurs. From the results of the survey, however, it is possible to give an indication of the distribution of interest within the NNR (**Map 2**). The northern most edge has no Threatened species and a higher proportion of veteran trees of no interest. Beyond this there is a belt of open parkland about Lawn Pond, which is very rich in Threatened and Near Threatened lichens, along with local high densities of trees of high interest. Above this the fringe of the denser pasture woodland is rich with the woodland itself also supporting trees of high interest. The distribution of interest within the upper woods requires much more work, but the more sheltered areas appear to be the richest.

3.1.2 Lichen Assemblages

Although the park supports a rich lichen assemblage, there are large numbers very lichen poor veteran trees. The large numbers of largely barren big ancient Oaks was especially noticeable. These are trees that lost their lichen interest due to past acidification and have not yet been recolonised. Among these are scattered veteran trees with lichen interest, with younger post mature veterans noticeable less degraded that the oldest trees. These can vary from trees with a few relic patches of

veteran tee specialist lichens to trees with a high cover of nearly intact communities of conservation interest. The impact of acidifying pollution was most likely proportional to the buffering capacity of bark of the individual trees. Notable absences are specialist old woodland species of acid bark and the most sensitive leafy species of base rich bark. The former lost their habitat altogether; the trees they grew on had poorly buffered bark that was already acidic and subsequently became too acid to support any interest. The latter lichens, such as *Lobaria* species, are very sensitive to sulphur dioxide and can be lost even where well buffered bark remains base rich. Within these constraints there are some impressive local survivals of assemblages of crustose lichens of mesic, base rich and dry bark along with some other habitats. The considerable interest on lignum could potentially represent a degree of colonisation as well as survival.

The species of conservation are nearly all found on veteran trees or dead trees. Communities on younger trees are mainly unremarkable. Twig communities suggest high ammonia levels and three "CENNAD Lichen Ammonia Monitoring" forms were filled in for Oak trees near Lawn Pond by Barbara. M. Brown and Shirley Hancock. These indicated that the twigs on the trees by the Lawn Pond were "Very N polluted". This is supported by the APIS website, which gives the background level at 1.51 μg m^3, well over the critical level for lichens of 1.0 μg m^3) for the Moccas area. These ammonia levels obviously vary across the site with some ammonia sensitive species, such as *Usnea* species, surviving in sheltered areas but also with assemblages indicative of very high nitrogen levels along the northern edge, especially close to the farm. As discussed above an impact on trunk communities was also visible in the most ammonia polluted areas to the far north. The trunk communities are less obviously damaged to the south by nitrogen, even by Lawn Pond. However, such communities are slow growing and show considerable inertia to change. Twig in contrast have a fast turnover of species and provide an early warning of increasing nitrogen pollution.

The lichen species of conservation interest are found in several habitats, which distinct distributions within the park. The communities or assemblages contributing to the lichen interest are described below. The most widespread habitat is mesic to base rich bark assemblages on parkland trees (Mature Mesic Bark Community, *Pertusarietum amarae*) (**Map 3**, 35 locations with systematically surveyed lichens) with dry bark on veteran trees (Ancient Dry Bark Community *Lecanactidetum premneae* and Dry Bark Community *Calicietum hyperelli*) also widespread (**Map 4**, 30 locations). More localised interest was found on lignum (Dry Lignum Community, *Calicietum abietinae* & Damp Lignum *Cladonietum coniocraeae*) (**Map 5**, 14 locations), Base Rich Bark Woodland Community (*Lobarion pulmonariae* & *Agonimion octosporae*) (**Map 6**, eight locations) and Wound Tracks Assemblages (**Map 7**, five locations).

Mature Mesic Bark Community (*Pertusarietum amarae*): found on mature and less acidic bark on the wet side of mature trees in sheltered conditions. The basic community is composed of widespread lichen species, especially *Pertusaria* species including *Pertusaria hymenea*, *Pertusaria pertusa* and *Pertusaria amara* f. *amara* along with *Phlyctis argena*. *Pertusaria flavida* is characteristic of the more species rich variants. This community occurs widely through the countryside on older trees but additional ancient woodland species, or veteran tree specialists, can occur in older woodland stands and in parks. On well-lit bark, the dominant crust forming lichens are partly displaced by leafy "*Parmelia*" species (Well Lit Mature Bark Community, *Parmelietum revolutae*). This latter community is poorer in species of conservation interest.

A total of 10 species of conservation interest were recorded from this habitat, of which nine were recorded in 2018. Rare species characteristic of the Mature Mesic Bark Community include south western forest species, which are absent from

Moccas Park and a well-defined assemblage of southern sub-oceanic species. The latter are a prominent feature here. These are characteristic of veteran trees, mainly Oak in well-lit but sheltered locations. They are typical of parklands and woodland edge sites but are absent from deep woodland habitats. The assemblage is likely to have had is core area of distribution in the English midlands but has been largely lost from this area due to acidifying air pollution. The assemblage survives on the fringes of this area where pollution was lowest, especially in eastern central Wales and the Marches (Sanderson, 2014). Many are also rare in continental Europe (http://wales-lichens.org.uk/species-account/lecanora-sublivescens.). The most widespread of these sub-oceanic species at Moccas Park is *Lecanora sublivescens*, which is tolerant of more acidic bark, and was recorded at 19 locations in 2018 (**Map 15**). This is a large population and, given the 2018 survey was a transect, the actual population could be among the largest in Europe. The other species, *Caloplaca lucifuga* (**Map 26**) and *Lecanora quercicola* (**Map 26**), require bark at the more base rich end of the range of the habitat. They are much less frequent here, both being found at two locations each. A further special species is *Pertusaria coronata* (**Map 34**), a more northern sub-oceanic species that is very rare south of the Scottish Highlands and was new to the park and Hereford in 2018, which was also found at two locations in 2018. A notable absence from Moccas was *Caloplaca herbidella* s. lat.; both the species included in this aggregate are strongly base demanding so are likely to have been lost from the park if they occurred. One of the most important finds in 2018 was *Dimerella tavaresiana* (*Coenogonium tavaresianum*). This is an internationally rare southern Atlantic–Mediterranean lichen, which has recently been found in Britain. Here it occurred in base rich seepages with species rich mesic bark communities on two veteran Oaks (**Map 21**). *Rinodina exigua* (**Map 37**) is new to Britain and an important addition to the assemblage of sub-oceanic lichens found at the park. In Baden-Württemberg, Wirth (1995) describes *Rinodina exigua* as mainly occurring in foothills and mountains, but not high into the mountains on the bark of free standing deciduous trees (rarely conifers) predominantly on Lime and Oak on nutrient enriched bark, especially avenue trees (i.e. parkland trees in an English context). Rare in Baden-Württemberg. The park also supports a large population of the veteran tree specialist *Rinodina roboris* var. *roboris* (**Map 38**). Other species of interest recorded in 2018, were *Arthopyrenia nitescens*, an unexpected record of an oceanic species, found on a young Oak, *Lecidella* sp A an apparently rare undescribed obligate parasite of *Pyrrhospora quernea* on veteran trees (**Map 29**) and *Sphinctrina turbinata* (**Map 39**), a local obligate parasite of *Pertusaria pertusa* typically found in parkland habitats.

Only a single species typical of this habitat recorded previously was not refound in 2018, *Pertusaria multipuncta*. This is a widespread species.

A total of 35 trees were waymarked as supporting systematically recorded species characteristic of this habitat (**Map 3**) in 2018. The assemblage is prominent on veteran Oak, and also two Ash trees, around Lawn Pond and on the open lower slopes. The habitat is absent from more wooded upper slopes, where trees are too shaded. It is also rare along the north western edge, where ammonia pollution is highest.

Species recorded in Mature Mesic Bark Community (*Pertusarietum amarae*):

Species	**Conservation Status**	**2018**
Arthopyrenia nitescens	Nb (NS/IR)	1
Caloplaca lucifuga	VU (NR/S41)	1
Dimerella tavaresiana	Nb (NR)	1
Lecanora quercicola •	VU (NS/IR/S41)	1
Lecanora sublivescens •	NT (NS/IR/S41)	1
Lecidella sp A	NE (NR)	1

Pertusaria multipuncta •		
Pertusaria coronata	Nb (NS)	1
Rinodina exigua	NE	1
Rinodina roboris var. roboris	Nb (IR)	1
Sphinctrina turbinata	Nb (NS)	1

• = SOWI species
1 = Recorded in 2018

Dry Bark Assemblages on Veteran Trees (*Lecanactidetum premneae* & *Calicietum hyperelli*): this habitat occupies the dry sides of ancient Oaks and rarely other tree species. The most distinctive community, Ancient Dry Bark Community (*Lecanactidetum premneae*), is strongly associated with veteran Oaks and old growth woodland. It is internationally very rare, and otherwise known only from a few sites in France, but is widespread in southern Britain (James et al, 1977). Several characteristic species are hence International Responsibility species, and the community is of great conservation importance. This is a community of highly stressed habitats and it is not species rich but supports a high proportion of species of interest. In the New Forest evidence of chronosequences indicates that this community takes over 400 years to fully recolonise clear felled sites (Sanderson, 1996 & 2010). The Ancient Dry Bark Community is a southern oceanic community, typical of warm moist, but not too wet, areas. The lichens grow on bark only occasionally reached by stem flow and mainly absorb water from dew. On very dry bark here this community grades into more general dry bark communities, including the Dry Bark Community (*Calicietum hyperelli*). This is more typical of drier less oceanic climates but can also support some specialist species, especially pinhead fungi.

A total of 15 species of conservation interest have been recorded from this habitat and related dry bark habitats, of which 12 were recorded in 2018. Of the characteristic Ancient Dry Bark Community species, *Cresponea premnea* is still widespread and was recorded at 20 locations (**Map 22**). Other species that are characteristic of this community were all rare and were only found on single trees in 2018. The oceanic species *Lecanographa lyncea*, its near obligate parasite *Milospium graphideorum* and *Sporodophoron cretaceum* (**Map 8**) were all found on a single tree. On a second tree the more sub-oceanic rare *Lecanographa amylacea* was found (**Map 25**). *Buellia violaceofusca*, now known to be a Trebouxia green algae form of *Lecanographa amylacea* a Trentepohlia green-orange algae lichen (Ertz et al, 2018), thalli were associated with *Lecanographa amylacea* on this tree.

More generalist dry bark species (Dry Bark Community, *Calicietum hyperelli*) also occur including *Bactrospora corticola* (**Map 12**), a northern and eastern species new to the park, *Calicium salicinum* (**Map 14**), *Chaenotheca chrysocephala* (**Map 17**) and *Chaenotheca trichialis* (**Map 18**). Two species, *Chaenothecopsis nigra* (**Map 19**) and *Protoparmelia oleagina* (**Map 35**), which are more typically found on lignum, both nationally and in the park, were found on bark on single trees.

Three species *Arthonia arthonioides*, *Lecanactis subabietinum* and *Opegrapha xerica* were not refound in 2018, but the first two of these are rather doubtful records not backed up by known specimens. The latter is very likely but easily overlooked.

A total of 30 trees, all Oak, were waymarked as supporting systematically recorded species characteristic of this habitat (**Map 4**) in 2018. The habitat is widespread, being found around particular Lawn Pool and the edge of the denser pasture woodland on the mid slope, extending upslope into the pasture woodland and the poorer northern fringe. The greatest diversity was on the fringe of the denser pasture woodlands in the mid slopes. The assemblage is rich but lacks several typical species that do occur in less polluted old growth stands to the west in the

Marches and east central Wales. The limited number of very rich trees but widespread poorer trees with single species of interest, especially *Cresponea premnea* is typical of sites damaged but not destroyed by acidifying pollution.

In nutrient enriched habitats the Ancient Dry Bark Community is displaced by the Nutrient Rich Dry Bark Community (*Arthonietum impolitae*). It is a species poor community dominated by *Arthonia pruinata*, sometimes with *Schismatomma decolorans*. This was had occurred locally in the park especially to the north

Species recorded in the Dry Bark Assemblages (*Lecanactidetum premneae* & *Calicietum hyperelli*):

Species	**Conservation Status**	**2018**
Arthonia arthonioides	Nb (NS)	
Bactrospora corticola	Nb (NS)	1
Calicium salicinum		1
Chaenotheca chrysocephala •		1
Chaenotheca trichialis •		1
Chaenothecopsis nigra	Nb (NS)	1
Cresponea premnea •	Nb (IR)	
Lecanactis subabietinum •	Nb (IR)	1
Lecanographa amylacea •/	VU (NS/IR/S41)/	1
Buellia violaceofusca	NT (NR/IR/S41)	1
Lecanographa lyncea •	Nb (IR)	1
Milospium graphideorum	Nb (NS)	1
Opegrapha xerica	Nb (NS)	
Protoparmelia oleagina	Nb (NS)	1
Sporodophoron cretaceum	Nb (IR)	1

• = SOWI species
1 = Recorded in 2018

Dry Lignum (*Calicietum abietinae*) & Damp Lignum (*Cladonietum coniocraeae*) Communities: a variety of species poor communities develop on bare wood (lignum), both on live trees and dead trees. Where large pieces of dead wood or very dry bark on old trees occur, as is typical in old growth stands, uncommon specialist species can occur. The most widespread community (Damp Lignum Community) is found on damper dead wood and stumps with the lichens *Cladonia* species dominant and crust forming *Trapeliopsis* species. This habitat is found beyond old growth stands and is visually striking but not usually of great interest, however, it can support species of interest. A more specialist habitat occurs on acid dry wood on vertical surfaces of either standing dead wood or the sides and undersides of very large fallen logs (Dry Lignum Community). Characteristic lichen species include several Pin Head lichens and fungi. Species of interest can also be found old worked timber, as on gate and park pales as at Moccas Park.

A total of eight species of conservation interest were been recorded from this habitat and related dry bark habitats, of which all were recorded in 2018. Damper wood locally supports *Cladonia parasitica* (**Map 20**) new to the site, but most species of interest are found on drier standing or propped dead wood. A significant discovery made in 2018 was the finding of *Buellia hyperbolica* on three fallen logs. This is a rare southern Atlantic–Mediterranean lichen recorded from a few parks and pasture woodlands in southern England and Wales. Other new species included the northern *Lecidea nylanderi* (**Map 28**), only recently recorded from England, *Chaenothecopsis nigra* (**Map 19**), the rarely recorded *Ochrolechia arborea* (**Map 31**) and *Protoparmelia oleagina* (**Map 35**). The latter two were also recorded on the gate on the northern edge of the park. Mark Powell pointed that gate was richer than posts and pales and suggested that lower slug access to the gate was the reason for this.

A total of 14 locations were waymarked as supporting systematically recorded species characteristic of this habitat (**Map 5**) in 2018. These were confined to the lower ground around Lawn Pond and the lower slopes up into the fringes of the denser woodland in mid slopes. At the locations of interest, nine were fallen trees or limbs, three were on exposed lignum on live trees and one was a gate. All but one the locations involved Oak lignum, the other was Chestnut lignum. An interesting feature is the high proportion of new species to the site found in 2018 for this habitat. This has also been observed in other old growth sites acidified by past pollution. Some of this increase is probably partly due to increased skill in lichenologists but lignum habitats do genuinely appear to be improving faster than other veteran tree habitats. The specialist species may be, of necessity, faster colonising than bark species, due to the more ephemeral habitat represented by dead wood.

Species recorded on lignum habitats (*Calicietum abietinae* & *Cladonietum coniocraeae*):

Species	**Conservation Status**	**2018**
Buellia hyperbolica	VU (NR/S41)	1
Chaenotheca brunneola •		1
Chaenothecopsis nigra	Nb (NS)	1
Cladonia parasitica •		1
Imshaugia aleurites		1
Lecidea nylanderi	Nb (NS)	1
Ochrolechia arborea	NT (NR)	1
Protoparmelia oleagina	Nb (NS)	1

• = SOWI species
1 = Recorded in 2018

Base Rich Bark Woodland Community (*Lobarion pulmonariae* & *Agonimion octosporae*): a very rich habitat best developed on veteran trees with base rich bark. Typically found on bark that is flushed by base rich water from above. Unlike many other communities the basic community is composed of ancient woodland species so any occurrence is of interest. On damp bark with a high pH, base demanding mosses are usually prominent. This moss community can occur in both shady and exposed conditions and in both situations the *Lobarion* lichens are absent. However, in intermediate light conditions a rich community of ancient woodland lichens can develop. There is a critical balance between light and humidity, which varies from east to west. Further west in humid climates light levels become more critical than shelter from summer sun. The requirement for high pH bark has made the community vulnerable to bark acidification caused by air pollution and some of the most sensitive species have declined drastically over the 20th century.

The habitat shows a strong north to south gradient, with classic large leafy species dominant with fewer crust forming species in the north west (*Lobarion pulmonariae*), while to the south west the habitat is much richer in crust forming species (*Agonimion octosporae*). The latter community replaces the *Lobarion* in shaded humid woods in oceanic Mediterranean and southern Atlantic climates. In southern Britain the *Agonimion octosporae* is something of a "deep forest" assemblage and is best developed in large little disturbed old growth woodlands.

A total of 11 species of conservation interest have been recorded from this habitat, of which 10 were recorded in 2018. None of these were characteristic large leafy species; these have all being lost to past acidifying pollution. The assemblage of crustose species includes quite few southern species, including *Agonimia flabelliformis*, *Agonimia octospora*, *Opegrapha corticola*, *Porina coralloidea* and *Thelopsis rubella* (**Maps 8**, **32** & **40**). These are all edge of range species here, especially

Agonimia octospora, which was new to the Welsh Marches, while *Porina coralloidea* is very rare in this area. Other more generalist species recorded in 2018 were *Arthonia vinosa* (**Map 9**), *Bacidia biatorina* (**Map 10**), *Pachyphiale carneola* (**Map 33**), *Piccolia ochrophora* and *Thelotrema lepadinum* (**Map 8**). The latter is not a typical base rich bark species but is rather a characteristic acid to mesic bark woodland species. At Moccas it was only found once, growing on the edge of a base rich bark woodland community. It was the only survival of an element of the park lichen assemblage, acid to mesic woodland lichens, otherwise almost entirely lost to acidification.

A single species *Catinaria atropurpurea* was not refound in 2018. It is a small widespread species, which is easily overlooked.

A total of eight trees were waymarked as supporting systematically recorded species characteristic of fully developed example of this habitat (**Map 6**) in 2018. The distribution of the systematically mapped species is very restricted, with recorded trees confined to the denser pasture woodlands in the mid to upper slopes. This is the most sheltered humid area within the park; the optimum habitat for this assemblage. All trees were Oak trees. One exceptional tree supported much of this interest. This remarkable tree had a full developed southern oceanic woodland base rich bark assemblage. The other Oaks had more limited relic assemblages.

Species recorded in Base Rich Bark Woodland Communities (*Lobarion pulmonariae*):

Species	**Conservation Status**	**2018**
Agonimia flabelliformis •	Nb (NR)	1
Agonimia octospora •	NT (NS/IR)	1
Arthonia vinosa •		1
Bacidia biatorina •		1
Catinaria atropurpurea •		
Opegrapha corticola •	Nb (IR)	1
Pachyphiale carneola •		1
Piccolia ochrophora •		1
Porina coralloidea •	Nb (NS/IR)	1
Thelopsis rubella •		1
Thelotrema lepadinum •		1

• = SOWI species
1 = Recorded in 2018

Wound and Rain Tracks Assemblages: wound tracks and well developed rain tracks on base rich trees can support a series of specialist species that tend to occur in single species stands. This assemblage was best developed on veteran Elms and has obviously declined in recent years. Many characteristic species are now Red Data Book and S41 species due to the total loss of veteran Elm in the lowlands. Old Elms Moccas Park does not appear to have been a very significant feature when the first surveys were carried out, but *Bacidia incompta* was recorded from Elm. Other tree species can also support wound tracks specialist lichens, with Ash, Maple and Horse Chestnut found to be significant in 2018 at Moccas Park.

A total of seven species of conservation interest were been recorded from this habitat, all of which were recorded in 2018. Three particularly significant species were recorded in 2018: with *Bacidia incompta* (**Map 11**) and *Gyalecta flotowii* (**Map 23**) refinds and *Ramonia dictyospora* (**Map 36**) new to the site. *Bacidia incompta* was found two Maples and two Horse Chestnuts in the gully below the limestone outcrop on the scarp, which is a sizable population for Britain. *Ramonia dictyospora* was found on one of these Maples, while *Gyalecta flotowii* was found on an Ash low down in the north east of the park. The gully also produced *Leptogium subtile* (**Map 30**) and *Porina*

borreri also new to the site. More widespread species noted in 2018 were *Caloplaca phlogina* and *Strigula taylorii*.

This is an impressive assemblage with locally enough wound prone trees to maintain sustainable populations of threatened or near threatened species. The distribution of systematically surveyed species (**Map 7**) shows the concentration of wound prone Maple and Horse Chestnut in the gully on the scrap. There were other Horse Chestnut stands that were visible but not visited during the 2018 survey and these could also be significant for wound track specialists.

Wound and Rain Tracks Assemblages:

Species	**Conservation Status**	**2018**
Bacidia incompta	VU (NS/S41)	1
Caloplaca phlogina	Nb (NS)	1
Gyalecta flotowii	NT (NS)	1
Leptogium subtile	Nb (NS)	1
Porina borreri	Nb (NS)	1
Ramonia dictyospora	NT (NS/IR/S41)	1
Strigula taylorii	Nb (NS/IR)	1

1 = Recorded in 2018

Rocks: the small outcrops of sandstone and impure limestone at the head of the gully in the scarp add greatly to the lichen diversity. The assemblage is not outstanding, except for the occurrence of two rare mainly northern species *Gyalecta ulmi* EN (NR/IR/S41) and *Pertusaria amarescens* Nb (NR). The latter is a little known species similar to the tree species *Pertusaria flavicans*, which was recorded once in 1968 and has not been since. This was the only English record of a species otherwise mainly known from the eastern Scottish Highlands. The other species, *Gyalecta ulmi*, is in contrast a distinctive species, with a well-documented history from the site. Nationally the species was known from old Elms and limestone outcrops. The former habitat has been completely lost, considerably reducing the species distribution. Only two sites are known to survive in England on limestone, the other in northern England.

In 2018 the *Gyalecta ulmi* population was photo monitored by Steve Price (**Annex 1 A9**). It occurred on three outcrops and was abundant and growing strongly on one (**MO050**) but with a poor growth on the others (**MO051** & **MO052**). A fourth population on the south side of the gully noted in 2003 by Bryan Edwards was not reached in 2018. The strong population was still well lit while to week populations were heavily shaded Hawthorns. The strong population (**MO050**), however, was thought likely to be threatened with increasing shade from invading Hawthorns. In comparison with 2003 monitoring photographs taken by Bryan Edwards, the strong population (**MO050**) had substantially increased in extent since then. Of the two weaker colonies had **MO052** had only expanded to a limited extent since 2003 and **MO051** had contracted since then.

4.0 NATURE CONSERVATION VALUE AND MANAGEMENT

4.1 Nature Conservation Value

4.1.1 Value of Lichen Assemblage

The parkland scores 22 using the SOWI (Southern Oceanic Woodland Index) for all data and 19 for the 2018 survey. The threshold for SSSI quality in this index in this area is 20 (Sanderson et al, 2018). So the index score is on the borderline of SSSI quality using this assessment. This is a high score, however, for an area that was badly impacted by acidifying pollution in the latter part of the 20th century. The park also supports many species of conservation interest in their own right. These are listed below (• = Section 41 species):

One Endangered RDB species, one seen in 2018:		**Surveys**	
Species	**Status**	**1968-2002**	**2108**
Gyalecta ulmi •	NR/IR	1	1
Total number EN species		**1**	**1**

Five Vulnerable RDB species, five seen in 2018:		**Surveys**	
Species	**Status**	**1968-2002**	**2108**
Bacidia incompta •	NS	1	1
Buellia hyperbolica •	NR		1
Caloplaca lucifuga •	NS	1	1
Lecanographa amylacea •	NS/IR	1	1
Lecanora quercicola •	NS/IR		1
Total number VU species		**3**	**5**

Six Near Threatened RDB species, six seen in 2018:		**Surveys**	
Species	**Status**	**1968-2002**	**2108**
Agonimia octospora	NS/IR		1
Buellia violaceofusca •	NR/IR		1
Gyalecta flotowii	NS	1	1
Lecanora sublivescens •	NS/IR	1	1
Ochrolechia arborea	NR		1
Ramonia dictyospora •	NS/IR/S41)		1
Total number NT species		**2**	**6**

Twenty-four Notable species, 20 seen in 2018:		**Surveys**	
Species	**Status**	**1968-2002**	**2108**
Agonimia flabelliformis	NR		1
Arthonia arthonioides	NS	1	
Arthopyrenia nitescens	NS/IR		1
Bactrospora corticola	NS		1
Caloplaca phlogina	NS		1
Chaenothecopsis nigra	NS		1
Cresponea premnea	IR	1	1
Dimerella tavaresiana	NR		1
Lecanographa lyncea	IR		1
Lecidea nylanderi	NS		1
Leptogium subtile	NS		1
Milospium graphideorum	NS		1
Opegrapha corticola	IR	1	1
Opegrapha xerica	NS	1	
Pertusaria amarescens	NR	1	
Pertusaria coronata	NS		1
Porina borreri	NS		1
Porina coralloidea	NS/IR		1
Protoparmelia oleagina	NS		1
Ramalina fraxinea	IR	1	
Rinodina roboris var. roboris	IR	1	1
Sphinctrina turbinata	NS	1	1
Sporodophoron cretaceum	IR		1

Strigula taylorii	NS/IR		1
Total number Nb species		**8**	**20**

This is a rich assemblage of Threatened Near Threatened and Notable species, and gives a very high total TNTN score of 60, with 56 scored in 2018. TNTN scoring is not used for woodland SSSI selection, however, a selection of field tree specialists is used to score the ecological assemblage "Old Trees of Open Places". This scores 33 for all data and 31 for the 2018 survey. This easily exceeds the SSSI quality threshold of 16 (Sanderson et al, 2018).

In addition, 10 of the species recorded in 2018 could be assessed as having populations that qualify for SSSI site selection in their own right as Threatened lichens in Britain (Sanderson et al, 2018). These are either Vulnerable or higher threatened species, or Near Threatened species that are International Responsibility species (*Gyalecta ulmi*, *Bacidia incompta*, *Buellia hyperbolica*, *Caloplaca lucifuga*, *Lecanographa amylacea*, *Lecanora quercicola*, *Agonimia octospora*, *Buellia violaceofusca*, *Lecanora sublivescens* and *Ramonia dictyospora*). Of these all, certainly qualify as having the only or largest viable population of a species the Area of Search (National Character Area 99 Black Mountains and Golden Valley). *Gyalecta ulmi* is also the largest population of a species in England as may be the *Lecanora sublivescens* population. One other species that was not assessed by Woods & Coppins (2012) *Dimerella tavaresiana* (*Coenogonium tavaresianum*) Nb (NR), is also likely to also have internationally important populations at Moccas Park, and another, *Rinodina exigua*, constitutes the first and currently only record for Great Britain and Ireland. Some other species are also likely to be selectable as Vulnerable or higher species in England lichen red list, but this list is still in early draft. At least two species were recorded at Moccas Park that are likely to be included in this list at Vulnerable or higher: *Gyalecta flotowii* NT (NS) and *Pertusaria coronata* Nb (NS).

The lichen assemblage at Moccas Park has been badly damaged by past acidifying pollution and is currently menaced by elevated ammonia levels. However, the park still has an interesting relict woodland assemblage along with nationally important ecological assemblages of "Old Trees of Open Places", at least nine rare specialist species of veteran trees with nationally important populations along with a nationally important population of *Gyalecta ulmi* EN (NR/IR/S41) on the limestone outcrop.

4.1.2 Distribution of Interest, 2018

The distribution of interest recorded in 2018 is shown on **Map 2**. The transect found reduced interest along the northern edge, thought to be due to the high levels of ammonia here, but there were frequent trees of interest in all the other areas looked at. Large areas of Moccas Park, however, were not looked at. Many of these can be expected also to have trees of great interest.

4.2 Management

4.2.1 Management Requirements of Woodland and Parkland Lichen Floras

The best conditions for woodland lichen assemblages are typically found in extensively grazed pasture woodland with a mixture of open high forest, glades and savannah like stands (Sanderson & Wolseley, 2001). The main positive features appear to be:

- Many trees surviving to senescence.
- Varying, but generally good light levels (with different lichen species having widely different tolerances).
- Shelter producing humid conditions.

- Slow woodland dynamics.

The basic mechanism driving this is a varying browsing pressure on tree regeneration that suppresses regeneration for long periods. A major interaction is between the shrub layer and the browsers; this can rapidly and drastically change the light and humidity levels without immediately altering the canopy layer (Coppins & Coppins 1998). Interactions between browsers and the canopy are much more long term, but frequent glades are required. Glades need to be dynamic but permanent features and slow dynamics are crucial. Coppins & Coppins (2002b), as an initial guide, suggest a requirement for at least 30% glades within the canopy of lichen rich woodlands and that the glades have a permanence of at least 30 years. In contrast, tree cover of less than 20 to 30% will result in the loss of woodland conditions and the resultant loss of the old growth dependent woodland lichen assemblages. Exceptions to the latter are found in parklands with veteran trees with wide spreading crowns in very sheltered valley bottoms or humid areas. In very wet oceanic areas, woodland conditions can also be maintained with less shelter and in more open areas. In these special conditions woodland lichen assemblages can survive in more open conditions.

There is no reason why such conditions could not be created by management outside of pasture woodlands, but this would not be easy. In particular, it is important to appreciate the scale of management required. Rare lichens typically have very low rates of occupation, as they require specialised niches found on only a few veteran trees. As a result, they tend to occur on very small numbers of trees within large populations of veteran trees. Each veteran tree will have different combinations of niches. Rather than just maintaining a few especially rich trees, sustainable management requires the maintenance of good conditions around dozens or hundreds of trees (depending of the size of the site), both veteran and maturing. To imitate browsing impacts fully, management would also be required to be annual. For example, without browsing, coppice regrowth around haloed veteran trees (trees with shrubs and maturing trees cut from around them) can cast a very dense shade on the lower trunks within three years or so. Extensive grazing appears to be the only practical method of maintaining large blocks of nationally or internationally important lichen rich woodland in the long term. Suitable conditions are unlikely to be found in woodlands managed efficiently for timber. Neither are they likely to be found within true non-intervention woodland with low browsing levels.

Parkland is an artificial habitat that maintains conditions similar to those found in the more open parts of pasture woodlands. The main difference is that natural regeneration is unlikely to occur and new generations of trees need to be provided by tree planting. Alternatively, parks could be rewilded and managed more extensively to allow natural regeneration. The latter would often be beneficial for lichens but would usually be in conflict with the preservation of designed landscapes. As well as woodland lichen assemblages, parklands can also provide a refuge for lichens of old field and wayside trees that were once much more widespread in the general countryside.

Parks are more likely to be negatively impacted by agricultural intensification and the resultant ammonia pollution than woodlands. Extensive grassland management with no or minimal fertiliser applications is required. Parks brought into arable production in the 20th century should be put back to permanent grassland. Parks are much more likely than woodlands to suffer from tree generation gaps. In most parks, little tree planting occurred between the agricultural depression of the 1870s and the 1960s. In parks with particularly serious generation gaps simply planting trees now with not solve the problem; many of the current veteran trees will be lost before the planted trees are old enough to be colonised by rare lichen species. In these situations, there may be solutions involving land adjacent to the surviving

open parkland. There was often tree planting in adjacent woods during the gap in parkland planting and mature 19th century Oak in adjacent habitats could be promoted as new veteran trees to bridge the gap. In many parks there has also been a tendency to fence off denser areas of veteran trees and patches of pasture woodland with the wider parks over the 19th and 20th centuries. Ideally conserving or restoring the lichen interest of such areas would involve thinning any dense post enclosure regeneration away from older trees, removing fences, and restoring grazing.

In heavily grazed parks individual trees of groves are sometimes fenced off to prevent direct damage to the trees from the stock. Ideally the grazing intensity should be reduced rather than fencing off the trees. If trees must be fenced off, then it is absolutely essential that the grazing be replaced with grass cutting, scrub control and Ivy control to maintain the parkland conditions around the lower trunks.

4.2.2 Comments on Management of the Parkland at Moccas Park

In general management within the park was positive for the nationally important lichen assemblage. The intensity of use has been reduced within the park and there is ongoing tree planting creating a new generation of trees. As an important landscape park, rewilding to the extent that natural regeneration becomes the main method of tree replacement across the park, is likely not to be practical.

There were a couple of small but significant issues noted within the park. The piling of fallen dead wood around the trunks of some veteran trees is a very damaging practise for the conservation of the lichens. The piles directly smother bark supporting rare species and, if grazing pressure is reduced further, could provide the locus for the growth of shading species such as Bramble and Ivy. Natural England is aware of the problems with this past practise and is gradually removing them. The piles were presumably intended as a dead wood invertebrate conservation measure, but this is surely misguided. The small logs involved are much less likely to host rare invertebrate species than standing dead wood or large diameter dead wood. Also species adapted to utilising small diameter dead wood are likely to disperse well enough that the logs do not need to be piled directly against the trunks of veteran trees.

Also there is an evident need for some Hawthorn clearance around the limestone outcrops to conserve the nationally important *Gyalecta ulmi* population. The *Gyalecta ulmi* population on the rock face that has remained open has prospered and greatly expanded since 2003. The more shaded populations have performed poorly and one has noticeable contracted. The species occurs on several very open limestone outcrops in the Scottish Highlands and any requirement for shade or shelter at Moccas Park will be met by the north east facing aspect of steep slope on which they are found.

External pollution from sources off the NNR has been the dominant factor threatening the lichen assemblage for at least a century. National policy has greatly reduced the impact of acidifying pollution from sulphur dioxide but ammonia pollution from intensive agriculture is now a considerable menace. Trunks along the northern edge are clearly impoverished by ammonia pollution, while twig assemblages though a wider area indicate high levels of nitrogen pollution.

4.2.3 Management within the Parkland at Moccas Park

As well as continuing with the current general management, the following actions are recommended within the park at Moccas specially for lichen conservation:

- Stop piling dead wood around the base of the trunks of veteran trees.

- Continue to remove existing piles dead wood around the base of the trunks of veteran trees.

- Carefully cut back the Hawthorn around the limestone outcrops. In some cases, this could simply be by crown lifting the bushes to let in more light to the rocks below than actual felling.

4.2.4 External Factors at Moccas Park

Ideally local high point sources of ammonia should be reduced or eliminated and land use on adjacent land reduced in intensity. This is not likely to be easily done.

4.3 Future Work

The 2018 survey was only a transect across the park, sampling some of the more promising looking habitat. A full survey allowing the full extent of the lichen interest Moccas Park to be determined would be desirable. This would allow the conservation and enhancement of the nationally important lichen assemblage at Moccas Park to be fully integrated into the management of the NNR.

5.0 REFERENCES

Alexander, K. N. A., Smith, M., Stiven & Sanderson, N. A. (2002) *English Nature research Reports No 494. Defining 'Old Growth' in the UK Context*. Peterborough: English Nature.

Coppins, B. J. (2002) *Checklist of Lichens of Great Britain and Ireland*. London: British Lichen Society.

Coppins, A. M. & Coppins, B. J. (1998) *Lichen Survey of Horner Woods NNR – 1998*. Unpublished Report to the National Trust.

Coppins A. M. & Coppins, B. J. (2002a) *Indices of Ecological Continuity for Woodland Epiphytic Lichen Habitats in the British Isles*. London: British Lichen Society.

Coppins A. M. & Coppins, B. J. (2002b) *Watersmeet SSSI (Part of Exmoor & Quantocks cSAC) Lichen Survey in the Hoaroak Water, Farley Water & East Lyn River March 2002*. An unpublished report to English Nature.

Ertz, D., Guzow-Krzemińska, B., Thor, G., Łubek, A. & Kukwa, M. (2018) Photobiont switching causes changes in the reproduction strategy and phenotypic dimorphism in the *Arthoniomycetes*. *Scientific Reports* **8**: 4952, DOI:10.1038/s41598-018-23219-3

Fritz, Ö. (2009) Vertical distribution of epiphytic bryophytes and lichens emphasizes the importance of old beeches in conservation. *Biodivers. Conser.* **18**: 289–304

Harding, P. T. & Alexander, K. N. A. (1993) The saproxylic invertebrates of historic parklands: progress and problems. In: *Dead Wood Matters: the Ecology and Conservation of Saproxylic invertebrates in Britain* (ed. K. J. Kirby & C. M. Drake) 58 – 73. Peterborough: English Nature.

Hodgetts, N. G. (1992) *Guidelines for Selection of Biological SSSIs: Non-Vascular Plants*. Peterborough: JNCC.

James, P. W., Hawksworth, D. & Rose, F. (1977) Lichen communities in the British Isles: A preliminary conspectus. In: *Lichen Ecology* (ed. M. R. D., Seaward) 295-413.

Rose, F. (1976) Lichenological indicators of age and environmental continuity in woodlands. In: *Lichenology: Progress and Problems* (eds: D H Brown, D L Hawksworth & R H Bailey) 279-307

Rose, F. (1992) Temperate forest management: its effects on bryophytes and lichen floras and habitats. In: *Bryophytes and Lichens in a Changing Environment*. (eds: J W Bates & A M Farmer) 211-233. Oxford: Oxford University Press.

Sanderson, N. A. (1996) *Lichen Conservation within the New Forest Timber Inclosures*. Eastleigh: Hampshire Wildlife Trust.

Sanderson, N. A. (2010) Chapter 9 Lichens. In: *Biodiversity in the New Forest* (ed. A. C. Newton) 84-111. Newbury, Berkshire; Pisces Publications

Sanderson, N. A. (2011) Scoring of threatened, rare and scarce lichens for site assessment. *British Lichen Society Bulletin*. **109**: 12-24.

Sanderson (2014) *Geranium Firedot* Caloplaca herbidella *Dossier: Survey of Sites 2012 to 2014*. A report by Botanical Survey & Assessment to Plantlife International.

Sanderson, N. A. (2018a) *A review of woodland epiphytic lichen habitat quality indices in the UK*. A report by Botanical Survey and Assessment for Natural England.

Sanderson, N. A. (2018b) *The development of TNTN lichen assemblage scoring*. A report by Botanical Survey and Assessment for Natural England.

Sanderson, N. A. Wilkins, T., Bosanquet, S. & Genney, D. (2018) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 13 Lichens and associated microfungi*. Joint Nature Conservation Committee 2018: Peterborough <jncc.defra.gov.uk/page-2303>

Sanderson, N. A. & Wolseley, P. (2001). Management of pasture woodlands for lichens. In: *Habitat Management for Lichens*. (ed. A. Fletcher) 05-1 – 05-25. London: British Lichen Society.

Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James P.W. & Wolseley. P. A. (2009) *The Lichens of Great Britain and Ireland*. London: British Lichen Society.

Wirth V. (1995) *Die Flechten Baden-Württembergs, Teil 2*. Stuttgart: Eugen Ulmer GmbH & Co.

Wolseley, P. A., James, P. A., Theobald, M. R. & Sutton, M. A. (2006) Detecting Changes in epiphytic lichen communities at sites effected by atmospheric ammonia from agricultural sources. *The Lichenologist*. **38**: 161-176.

Woods, R. G. & Coppins, B. J. (2012) *Species Status No. 13 A Conservation Evaluation of British Lichens and Lichenicolous Fungi*. Peterborough: JNCC.

ANNEX 1 FIELD NOTES

Key:

General
Coll. = Collected to confirm identity. Herb. = Collected specimen retained in author's herbarium. fr. = fertile.

Substrates
Ac = Maple, Ae = Horse Chestnut, Ap = Sycamore, Apl = Norway Maple, Cs = Sweet Chestnut, Fx = Ash, Q = Oak, Sn = Elder, L = As prefix, lignicolous, Tw = Twigs & branches, SLm = Limestone & SSd = Sandstone

Hosts for lichenicolous fungi: Z0242 = *Caloplaca cerinella*, Z0429? = sometimes appearing lichenicolous on *Cliostomum griffithii*, Z0578 = *Hypocenomyce scalaris*, Z0600 = *Lecanographa lyncea*, Z0639 = *Lecanora chlarotera*, Z0987 = *Flavoparmelia caperata*, Z1075 = *Varicellaria hemisphaerica*, Z1076 = *Pertusaria hymenea*, Z1087 = *Pertusaria pertusa*, Z1228 = *Pyrrhospora quernea* & Z1530 = *Xanthoria parietina*

Species in bold = systematically recorded species

A1 16/5/2018 Moccas Park BLS, Neil A Sanderson's Notes

A1.1 Lower Park, About Lawn Pool

Open parkland on the gently sloping lower ground. Poor polluted ancient Oaks widespread, especially nearer the northern edge of the park. Some Oaks much richer with some very significant trees found, especially to the south of the big pond. Well-developed sub-oceanic mesic bark assemblages are especially important. Also good dead wood interest.

SO346 428

A Norway Maple near the entrance gate (tag 01263). Despite being an introduced species, *Acer platanoides* is proving to be a good host for lichens which favour base-rich bark and it may be a good substitute for Fraxinus. The tree shown here has a weak rain-track in which a colony of *Piccolia ochrophora* is present (from Powell 2018).

MO001 (Tag 00006) (SO34621 42828, 69m): post mature Oak, dead wood pulled around base: bad practise

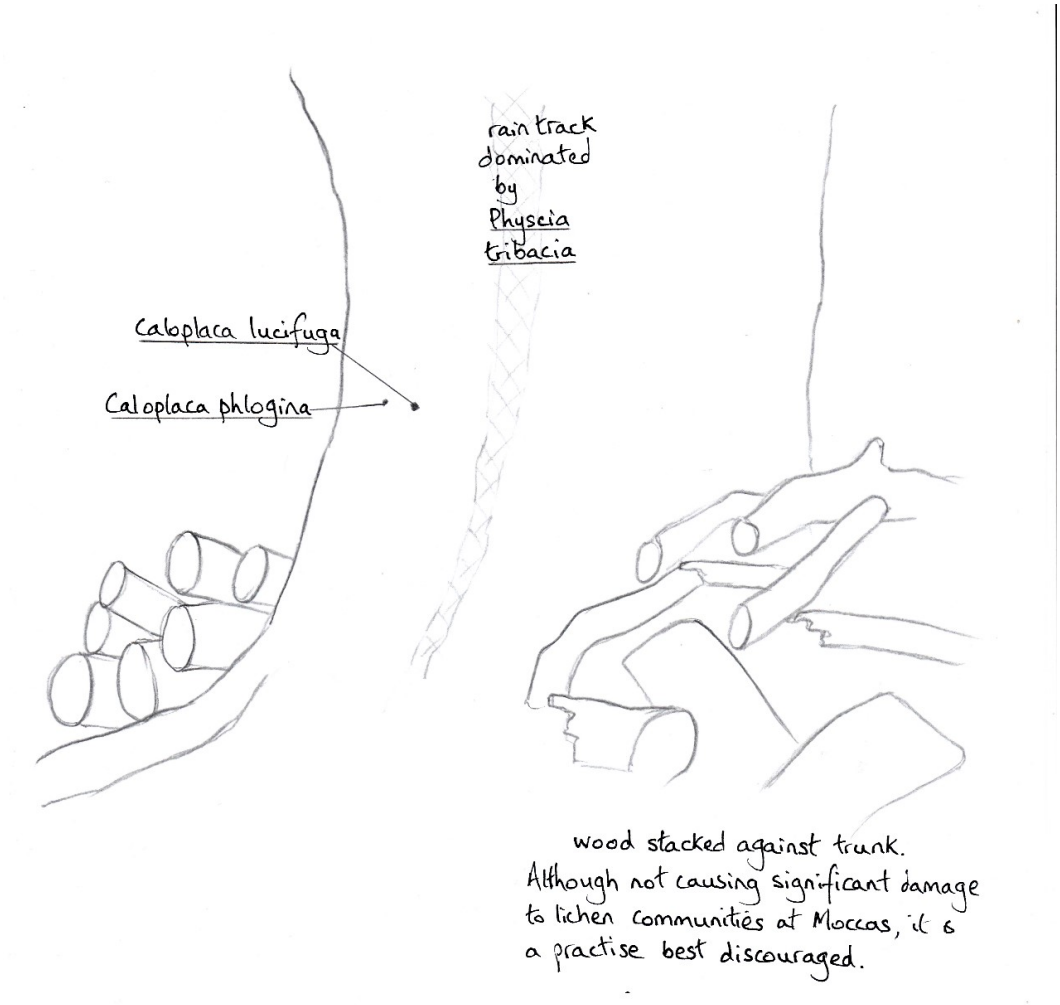
Caloplaca lucifuga Q

With

Physcia tribacia Q
Also
Caloplaca phlogina Q
Pertusaria flavida Q
Photo 2018-05-16-01

Photo 2018-05-16-01. **Tree MO001** (Tag 00006): a post mature Oak by the pond with a streak ***Caloplaca lucifuga***. The dead wood pilled around this trunk is very bad practise and a threat to the lichen assemblage of the trunk.

Trunk of **Tree MO001** (Tag 00006)) supporting the IUCN Vulnerable *Caloplaca lucifuga* (from Powell 2018)



Drawing of trunk of MO001 showing locations of rare species (from Powell 2018)

MO002 (tag 00004) (SO34621 42819, 68m): ancient Oak

Rinodina roboris* var. *roboris	Q
Cresponea premnea	Q
Also	
Enterographa crassa	Q
Normandina pulchella	Q
Pertusaria flavida	Q

MO057 (SO34624 42800, 70m) veteran Oak by lake edge

Bactrospora corticola	Q	Coll. Thallus with trentepohlia; black pycnidia only, with open ostiole; conidia 4 x 1.5 μm slightly curved

SO346 428

Species of Interest

Bactrospora corticola	Q	Coll. SO34624 42800
Caloplaca lucifuga	Q	
Cresponea premnea	Q	
Rinodina roboris var. roboris	Q	

Other species

Amandinea punctata	Q
Arthonia pruinata	Q
Chrysothrix candelaris	Q
Cladonia polydactyla var. *polydactyla*	LQ
Cliostomum griffithii	Q
Diploicia canescens	Q
Enterographa crassa	Q
Evernia prunastri	Q
Lecanora chlarotera	Q
Lecanora expallens	Q
Melanelixia glabratula	Q
Normandina pulchella	Q
Ochrolechia subviridis	Q
Pertusaria albescens var. *corallina*	Q
Pertusaria amara f. *amara*	Q
Pertusaria flavida	Q
Pertusaria hymenea	Q
Phlyctis argena	Q
Physcia tribacia	Q
Pyrrhospora quernea	Q

SO346 427

MO003 (SO34639 42744, 68m): ancient Oak

Rinodina roboris* var. *roboris	Q	On roots

SO346 427

Species of Interest

Rinodina roboris var. *roboris*	Q

Other Species

Candelariella reflexa	Q Tw
Flavoparmelia caperata	Q Tw
Fuscidea lightfootii	Q Tw
Hypogymnia physodes	Q Tw
Melanohalea elegantula	Q Tw
Melanohalea exasperatula	Q Tw
Parmelia sulcata	Q Tw
Physcia aipolia	Q Tw
Physcia tenella	Q Tw
Physconia enteroxantha	Q Tw
Punctelia subrudecta s. str.	Q Tw
Unguiculariopsis thallophila	Q Tw, Z0639
Usnea subfloridana	Q Tw
Xanthoria parietina	Q Tw

SO345 427

MO004 (Tag 00041) (SO34578 42745, 70m): post mature Oak

Protoparmelia oleagina	Q	On bark

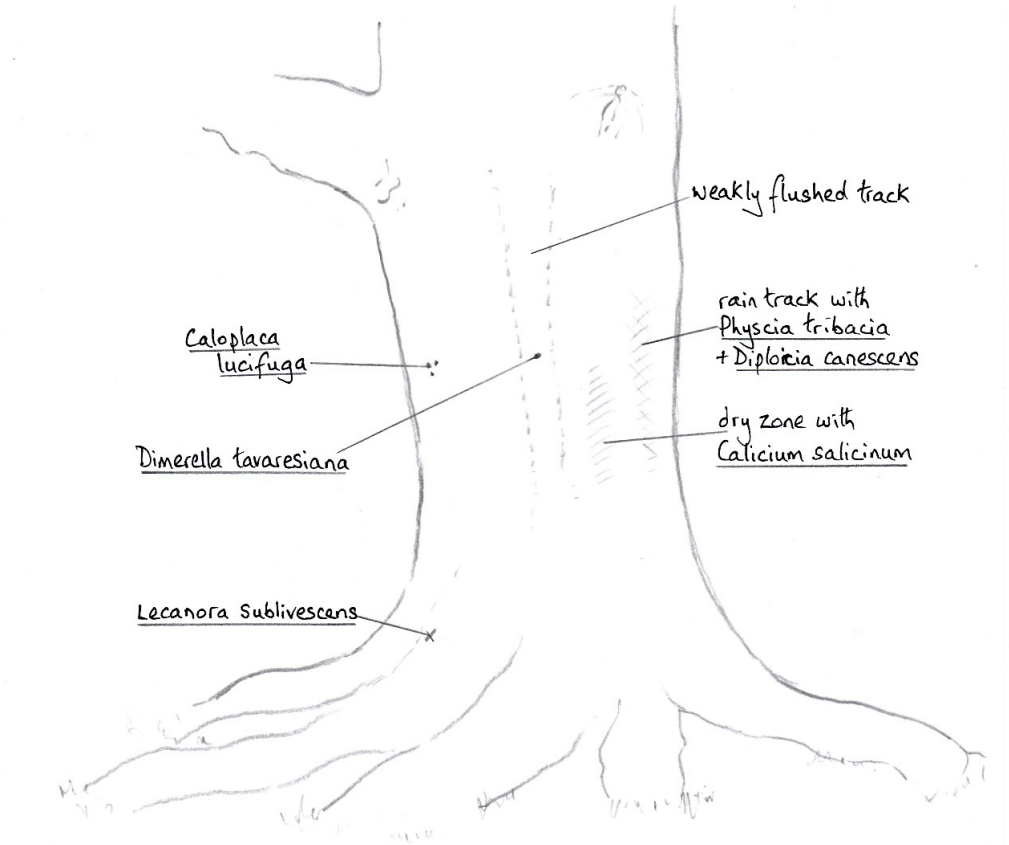
MO005 (tag 00040) (SO34572 42733, 72m): post mature Oak

Calicium salicinum	Q
Caloplaca lucifuga	Q
Cresponea premnea	Q
Dimerella tavaresiana	Q
Lecanora sublivescens	Q
Rinodina roboris* var. *roboris	Q
Mark added	
Lecanora quercicola	Q
Chaenothecopsis nigra	Q
Also	
Bacidia rubella	Q
Mark added	
Arthonia pruinata	Q
Caloplaca lucifuga	Q
Chrysothrix candelaris	Q
Diploicia canescens	Q
Lecanora expallens	Q
Lecanora sublivescens	Q
Pertusaria amara f. amara	Q
Pertusaria coccodes	Q
Pertusaria flavida	Q
Physcia tribacia	Q
Pyrrhospora quernea	Q
Schismatomma decolorans	Q

Photo 2018-05-16-03 & 04

Photos 2018-05-16-03 & 04. **MO005** (tag 00040): general views of a remarkable rich big post mature Oak with ***Caloplaca lucifuga***, ***Dimerella tavaresiana*** (***Coenogonium tavaresianum***), ***Lecanora sublivescens*** and ***Lecanora quercicola***.

Tree MO005, a 'particularly interesting old oak tree at SO34572.42725 supporting *Caloplaca lucifuga*, *Dimerella tavaresiana*, *Lecanora quercicola* and *L. sublivescens*' (from Powell 2018).



Drawing of trunk of MO005 showing locations of rare species (from Powell 2018)

MO006 (SO34574 42703, 75m): fallen Oak log

Buellia hyperbolica	LQ	1 thallus
Photo 2018-05-16-02		

Photo 2018-05-16-02. **MO006**: a fallen log with a single thallus of ***Buellia hyperbolica***.

MO007 (Tag 00045) (SO34531 42766, 77m): post mature Oak

Calicium salicinum	Q	
Lecanora sublivescens	Q	R
Rinodina roboris* var. *roboris	Q	O
Also		
Lecanora chlarotera	Q	Coll.
Varicellaria hemisphaerica	Q	

MO008 (Tag 00045) (SO34536 42781, 73m): small post mature Oak

Lecanora sublivescens	Q	R

MO009 (Tag 00051) (SO34525 42780, 74m): fallen Oak

Buellia hyperbolica	LQ	F
Lecidea nylanderi	LQ	
Also		
Mark added		
Cladonia digitata	LQ	
Clypeococcum hypocenomycis	Z0578, LQ	
Hypocenomyce scalaris	LQ	
Lepraria incana s. str.	LQ	
Trapeliopsis flexuosa	LQ	
Violella fucata	LQ	

MO010 (tag 00054) (SO34505 42784, 71m): post mature Oak

Cresponea premnea	Q	
Lecanora sublivescens	Q	
Also		
Bacidia rubella	Q	
Gyalecta truncigena	Q	Coll.
Mark added		

Chrysothrix candelaris	Q
Diploicia canescens	Q
Lepraria incana s. str.	Q
Opegrapha vulgata	Q
Pertusaria flavida	Q
Pertusaria hymenea	Q
Schismatomma decolorans	Q

SO345 427

Species of Interest

Buellia hyperbolica	LQ
Calicium salicinum	Q
Caloplaca lucifuga	Q
Cresponea premnea	Q
Dimerella tavaresiana	Q
Lecanora quercicola	Q
Lecanora sublivescens	Q
Lecidea nylanderi	LQ
Protoparmelia oleagina	Q, LQ
Rinodina roboris var. *roboris*	Q

Other Species

Bacidia rubella	Q
Cladonia coniocraea	LQ
Cladonia digitata	LQ
Cladonia fimbriata	LQ
Gyalecta truncigena	Q
Lecanora chlarotera	Q
Lecanora expallens	LQ
Lecanora saligna	LQ
Opegrapha vulgata	Q
Pertusaria coccodes	Q
Pertusaria pertusa	Q
Physcia adscendens	Q Tw
Physconia grisea	Q
Placynthiella icmalea	LQ
Trapeliopsis flexuosa	LQ
Varicellaria hemisphaerica	Q
Violella fucata	Q
Xanthoria parietina	Q Tw
Xanthoriicola physciae	Z1530, Q Tw

SO344 427

MO011 (Tag 00056) (SO34491 42795, 69m): post mature Oak

Calicium salicinum	Q
Rinodina* roboris var. *roboris	Q
Sphinctrina turbinata	Q, Z1087
Also	
Pertusaria pertusa	Q

MO012 (Tag 00059) (SO34479 42788, 68m): ancient Oak

Chaenotheca trichialis	Q
Cresponea premnea	Q
Lecanora sublivescens	Q
Rinodina roboris* var. *roboris	Q
Also	
Opegrapha varia	Q Coll.

Mark added
Arthonia pruinata Q
Diploicia canescens Q
Lecanora expallens Q
Pertusaria pertusa Q
Varicellaria hemisphaerica Q

MO013 (Tag 00058) (SO34480 42775, 66m): broken dead Oak
Cresponea premnea Q

MO064 (Tag 00286) (SO34456 42799, 80m): post mature Oak
Lecanora sublivescens Q

SO344 427
Species of Interest
Calicium glaucellum LQ
Chaenotheca trichialis Q
Cresponea premnea Q
Lecanora sublivescens Q
Rinodina roboris var. *roboris* Q
Other Species
Abrothallus microspermus Q, Z0987
Flavoparmelia caperata Q
Opegrapha varia Q

SO344 428

MO014 (SO34470 42835, 65m): fallen Oak dead wood
Chaenothecopsis nigra LQ Coll. One septate with dark septa
Protoparmelia oleagina Q

MO015 (Tag 00061) (SO34471 42864, 65m): ancient Oak by pond with exposed lignin
Chaenotheca brunneola LQ
Rinodina roboris* var. *roboris Q
Also
Buellia schaereri LQ Coll.
Laeviomyces pertusariicola Q, Z1087 (not Roselliniella sp A)
Pertusaria pertusa Q
Photo 2018-05-16-07

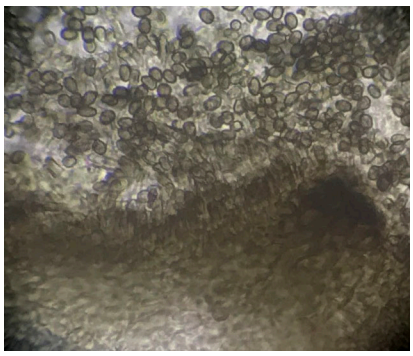


Photo 2018-05-16-07. **MO015** (Tag 00061): *Laeviomyces pertusariicola* conidia and conidiophores

MO016 (Tag 00062) (SO34478 42863, 64m): ancient Oak by pond
Bactrospora corticola Q Coll. Thallus with trentepohlia; black pycnidia only, with open ostiole; conidia 4 x 1.5

µm slightly curved. Herb. Sanderson 2404. New to VC36.

Also
Agonimia tristicula Q
Chaenotheca ferruginea LQ
Chrysothrix flavovirens LQ
Photo 2018-05-16-07

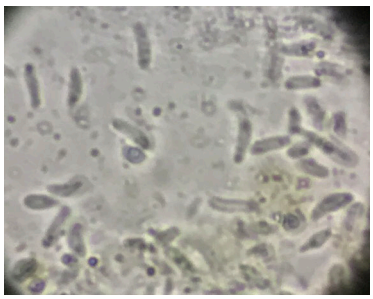


Photo 2018-05-16-07. **MO016**: *Bactrospora corticola* conidia

A1.2 Mid Slope of Park

Oaks on the base of the steeper slopes, trees thickening towards the wooded upper slope. Rich Oaks more frequent, still mainly with a rich field tree assemblage, but some woodland species appearing.

MO017 (Tag 00287) (SO34424 42739, 67m): post mature Oak
Pertusaria coronata Q K+Y, UV + O

Oak tree supporting a large patch of *Pertusaria coronata* (Powell 2018)

Pertusaria coronata, a great discovery by Nicola who recognised it as having a slightly different appearance to *P. coccodes* and with a K+ yellow (rather than K+ yellow turning red) reaction (Powell 2018).

SO344 426

MO018 (Tag 00292) (SO34447 42670, 73m): ancient Oak with exposed lignum

Cresponea premnea	Q
Lecanora sublivescens	Q
Lecidea nylanderi	LQ
Also	
Clypeococcum hypocenomycis	LQ, Z0578
Hypocenomyce scalaris	LQ

Shattered oak (tag 00292) with exposed lignum supporting *Lecidea nylanderi* (Powell 2018).

Lecidea nylanderi, with the black prothallus showing as a dark stain on the lignum (Powell 2018).

SO343 426

MO019 (SO34379 42649, 79m): dead Oak

Lecanora sublivescens	Q	F

MO020 (SO34357 42607, 88m): post mature Oak

Calicium salicinum	Q, Z0429	Appeared to be parasitising *Cliostomum griffithii*
Lecanora sublivescens	Q	

A moderately large oak tree (at SO34360.42539) [probably MO020] which is of interest in supporting a range of parkland lichen species including *Lecanora sublivescens*. It is useful to know that *L. sublivescens* can colonise trees which are not ancient suggesting that the continuity of some significant species may be achieved in the long term (Powell 2018).

Lecanora sublivescens (from Powell 2018).

SO343 426
Species of Interest

Lecanora sublivescens	Q	
Calicium salicinum	Q, Z0429	
Lecanora sublivescens	Q	

Other Species
Cliostomum griffithii

SO343 425

MO021 (SO34345 42552, 99m): burry Oak

Cresponea premnea	Q	
Also		
Opegrapha varia	Q	Coll.

MO022 (SO34356 42548, 103m): dying Oak

Calicium salicinum	Q	
Lecanora sublivescens	Q	
Mark added		
Sphinctrina turbinata	Q, Z1087	
Also		
Cliostomum griffithii	Q	
Mark added		
Chrysothrix candelaris	Q	
Pertusaria amara f. amara	Q	
Pertusaria flavida	Q	

Pertusaria pertusa	Q
Schismatomma decolorans	Q
Varicellaria hemisphaerica	Q

MO023 (SO34321 42540, 113m): big post mature Oak

Cresponea premnea	Q	
Dimerella tavaresiana	Q	
Lecanora quercicola	Q	
Lecanora sublivescens	Q	
Pertusaria coronata	Q	fr
Also		
Normandina pulchella	Q	
Pertusaria coccodes	Q	
Roselliniopsis tartaricola	Q, Z1075	
Varicellaria hemisphaerica	Q	

Photos 2018-05-16-05 & 06

Photo 2018-05-16-05. **MO023**: two adjacent similar lichens ***Pertusaria coronata*** top left with a stronger colour contrast between the isidia and the thallus (K + yellow spot test just visible, *Pertusaria coccodes* lower right (K + yellow to red spot test more visible at base).

Photo 2018-05-16-06. **MO023**: an exceptionally rich old Oak, with *Dimerella tavaresiana* (*Coenogonium tavaresianum*), *Cresponea premnea*, *Lecanora quercicola*, *Lecanora sublivescens* and *Pertusaria coronata*.

SO343 425
Species of Interest

Calicium glaucellum	LQ
Calicium salicinum	Q
Cresponea premnea	Q
Dimerella tavaresiana	Q
Lecanora quercicola	Q
Lecanora sublivescens	Q
Pertusaria coronata	Q

Other Species

Fuscidea lightfootii	LQ
Lecanora pulicaris	LQ
Normandina pulchella	Q
Ochrolechia microstictoides	LQ
Roselliniopsis tartaricola	Q, Z1075
Varicellaria hemisphaerica	Q

SO342 425

MO024 (Tag 03728) (SO34259 42568, 116m): old Oak on edge of wood

Cresponea premnea	Q
Lecanora sublivescens	Q
Pachyphiale carneola	Q

Also

Dactylospora parasitica	Q, Z1076
Pertusaria hymenea	Q

Bryophyte

Pterogonium gracile	Q

SO347 428

MO025 (SO34709 42860, 105m): gate in park pale; as pointed out by Mark, richer than the adjacent palings (slug access?)

Ochrolechia arborea	WT
Protoparmelia oleagina	WT
Also	
Hypogymnia physodes	WT
Imshaugia aleurites	WT
Lecanora aitema	WT
Lecanora symmicta	WT
Pseudevernia furfuracea var. *ceratea*	WT
Mark added, on gate:	
Evernia prunastri	WT
Hypogymnia physodes	WT
Hypogymnia tubulosa	WT
Micarea denigrata	WT
Parmelia saxatilis s. lat.	WT
Pseudevernia furfuracea var. *furfuracea*	WT
Violella fucata	WT
Mark added, on palings	
Lecanora expallens	WT
Lecanora pulicaris	WT
Lecanora conizaeoides f. *conizaeoides*	WT

'The entrance gate (SO34705.42860) flanked by park pales. The park pales are rather disappointing with thinly developed lichen crusts dominated by *Lecanora conizaeoides*, *L. expallens* and *L. pulicaris*. The gate rails support a much more exuberant and diverse lichen community which includes *Hypogymnia physodes*, *H. tubulosa*, *Imshaugia aleurites*, *Ochrolechia arborea*, *Protoparmelia oleagina*, *Pseudevernia furfuracea* and *Violella fucata*. I suspect that there is a reason why gates are often, as here, found to have richer lichen communities than on adjacent fencing. The park pales here are set in the ground and so there is easy access to molluscs. The gate has no such direct access for browsing molluscs. Apart from some grass which reaches the gate stiles, the route taken by any mollusc would involve climbing the gate posts and traversing iron gate fittings' (Powell 2018).

A2 17/5/2018 Moccas Park BLS, Neil A Sanderson's Notes

A2.1 Early Walk – Lower Park

Made and early morning circuit to the south of the main area looked at on the 16th June.

SO347 428
Palings

Lecanora conizaeoides f. *conizaeoides* WT

SO347 426

MO026 (Tag 00078) (SO34705 42663, 100m): ancient Oak above swamp
Rinodina roboris* var. *roboris Q F
Also
Bacidia rubella Q

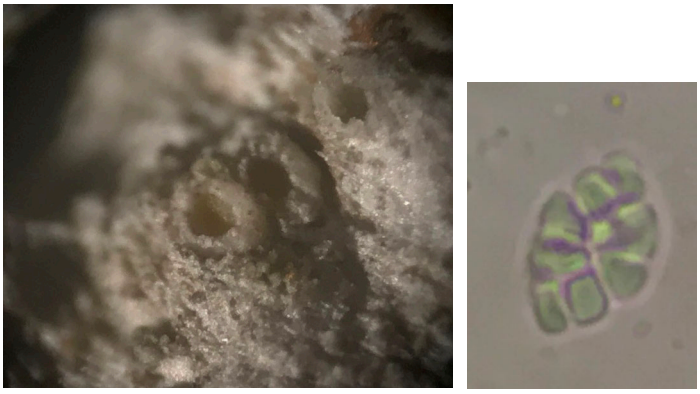
MO027 (Tag 00071) (SO34706 42620, 90m): post mature Ash
Rinodina exigua Fx Coll. Thallus K + orange, yellow UV + bright yellow at edges of spot; apothecia to 0.4mm diameter; mature spores in K are 18 – 22 x 8 – 9μm, *Physcia*-type ascospores[1]. Compared with *Rinodina roboris* from the New Forest and *Rinodina exigua* (this specimen had been previously miss-named as *R. capensis* and was so named when examined) from Ukraine. The New Forest *Rinodina roboris* has apothecia up to 0.75mm diameter, mature spores in K 17 – 22 x 12 – 15μm and match the drawing of the *Pachysporaria*-type ascospores in the LGBI2. The Ukrainian specimen of *Rinodina exigua* is generally similar with spores in K 19 – 23 x 9 – 11μm. The Ukrainian spores are a generally little longer and are visibly swelling a bit more at the midpoint in K. Herb. Sanderson 2411. In both the thalline exciple was I –[2]. The correct identity of this species as *Rinodina exigua*, rather than *R. capensis* was determined by Helmut Mayrhofer.

Steve Price added
Lecanora sublivescens Fx

Adjacent mature Ash with wound
Gyalecta flotowii Fx Coll. Exciple paler than disk, margin slightly crenate; spores 11 – 15 x 7 – 8μm, with few cells visible in optical section, many cross walls oblique. Herb. Sanderson 2405

Photos 2018-05-17-07, 15, 17 & 19 – 24

[1] Confirmed by Jan Vondrak emailed 22/7/2018 Your *Rinodina* seems to have rather *Physcia*-type spores than *Pachysporaria*- type.
[2] In retrospect indicating both specimens were not *R. capensis* but were *R. exigua*



Photos 2018-05-17-15 & 07. **MO027**: ***Gyalecta flotowii***, left shows the apothecia with slightly crenate pale margins, a passable "lead in" to detecting this species in the field. Right a spore, small with many cross walls oblique.

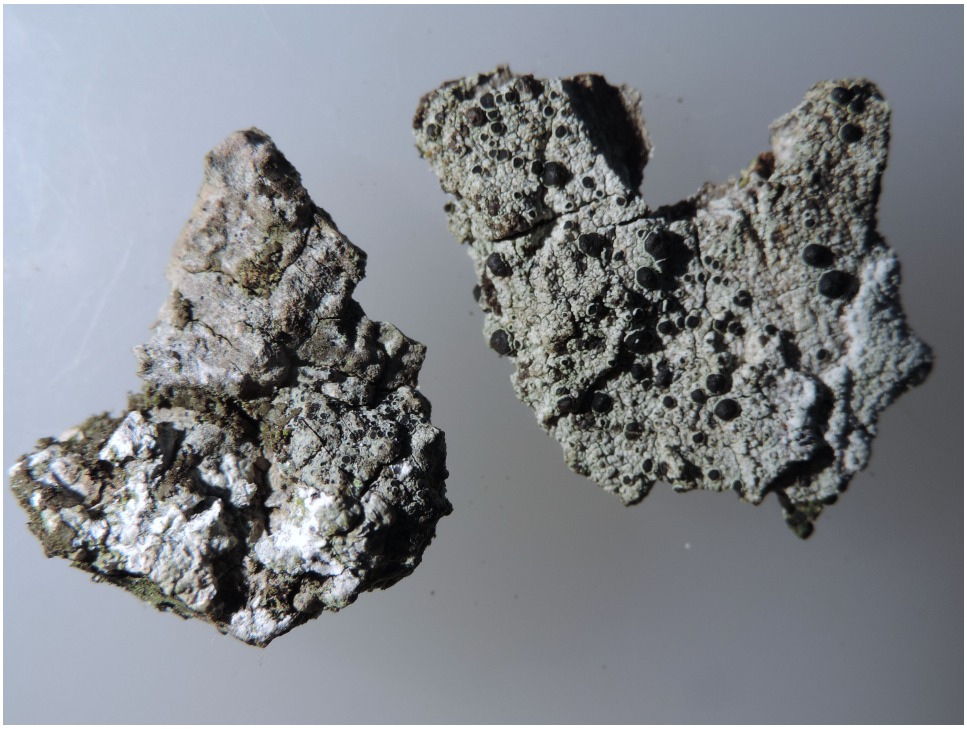
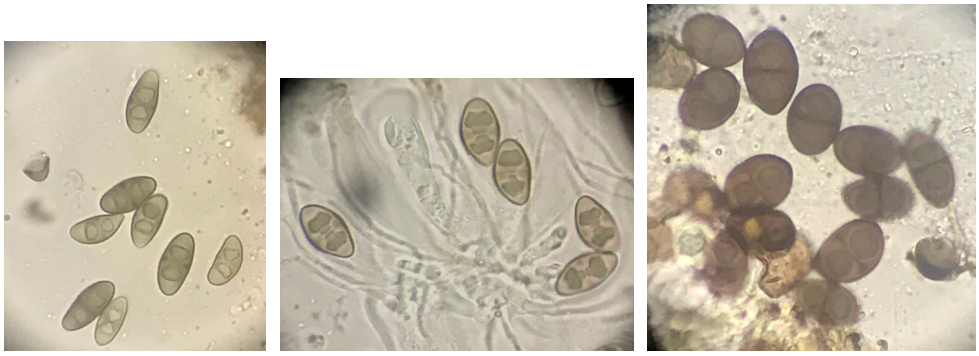


Photo 2018-05-30-19. **MO027**: Moccas *exigua* to left; New Forest *Rinodina roboris* to right

Photo 2018-05-30-19 Enlarge. **MO027**: closer view of Moccas specimen of *Rinodina exigua*



Photos 2018-05-30-17, 22 & 20. **MO027**: spores, *Rinodina exigua* Moccas left; *Rinodina exigua* Ukraine centre; *Rinodina roboris* New Forest right

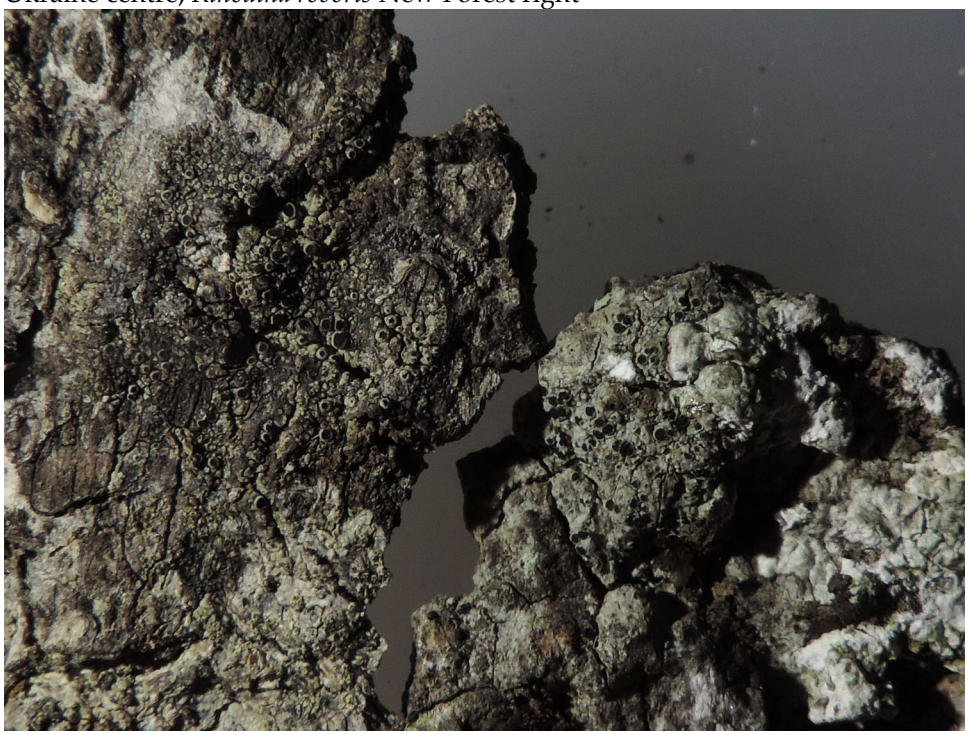


Photo 2018-05-30-21. **MO027**: *Rinodina exigua* Ukraine left (Beech), *Rinodina exigua* Moccas right (Ash)


Photo 2018-05-30-23 & 24. **MO027**: *Rinodina exigua* apothecia, Ukraine left (Beech), *Rinodina exigua* apothecia, Moccas right (Ash)

Species of Interest	
Rinodina roboris var. roboris	Q
Bacidia rubella	Q
Rinodina exigua	Fx
Lecanora sublivescens	Fx
Gyalecta flotowii	Fx
Other Species	
Phaeophyscia orbicularis	Q

SO346 425

MO028 (SO34637 42533, 94m): big post mature Oak. Old log pile at base

Rinodina roboris* var. *roboris	Q	F

MO029 (SO34608 42587, 86m): fallen Oak trunk

Cladonia parasitica	LQ	F
Also		
Imshaugia aleurites	LQ	

A2.2 Early Walk – Mid Slope in Park

As with the day before notable that more woodland species appear on the edges of the denser wooded slopes.

SO343 424

MO030 (SO34396 42459, 130m): ancient Oak in open

Cresponea premnea	Q	A
Opegrapha corticola	Q	R
Rinodina roboris* var. *roboris	Q	F

MO031 (SO34361 42484, 128m): fallen Oak

Cladonia parasitica	LQ	F
Adjacent ancient Oak		
Cresponea premnea	Q	
Lecanora sublivescens	Q	

Pachyphiale carneola	Q	
Rinodina roboris var. roboris	Q	
Also		
Amandinea punctata	Q	Coll.

A2.3 Main Meeting – Lower Park
Back to join up with the main meeting

Lower Park
Worked along the northern margin, much the poorest part of the park examined, most likely due to a combination of past acidifying pollution and current ammonia pollution.

Photo 2018-05-17-01. A general view across the open parkland of the lower park showing the more densely wooded mid slopes and upper slopes.

SO346 428

MO032 (Tag 00009) (SO34607 42873, 74m): post mature Oak

Rinodina roboris* var. *roboris	Q
Sphinctrina turbinata	Q, Z1087
Also	
Pertusaria pertusa	

SO345 420

MO033 (SO34511 43013, 73m): post mature Oak by lake

Rinodina roboris* var. *roboris	Q

MO034 (SO34513 43040, 80m): Oak stump in grassland

Cladonia parasitica	LQ
Also	
Cladonia cryptochlorophaea	LQ

MO035 (SO34501 43041, 80m): post mature Oak

Calicium salicinum	**Q**
Chaenotheca chrysocephala	Q
Rinodina roboris* var. *roboris	Q

SO345 430
Species of Interest
Cladonia parasitica
Calicium salicinum
Chaenotheca chrysocephala
Rinodina roboris var. roboris
Other Species

Candelariella vitellina f. *vitellina*	WT
Cladonia cryptochlorophaea	

SO344 431

MO036 (SO34454 43104, 80m): Old Ash, rather poor given superb habitat, near farm, strong smell of pig? Manure; strongly polluted with ammonia?

Rinodina exigua	Fx
Also	
Acrocordia gemmata	Fx
Arthonia pruinata	Fx
Arthonia radiata	Fx
Bacidia rubella	Fx
Caloplaca flavocitrina	Fx
Caloplaca ulcerosa	Fx
Diplotomma alboatrum	Fx
Hyperphyscia adglutinata	Fx
Lecania cyrtella	Fx Tw
Lecidella elaeochroma f. *elaeochroma*	Fx
Opegrapha rufescens	Fx
Opegrapha viridipruinosa	Fx Coll. K + yellow pigment in thallus & epithecium; spores 17 – 20 x 5μ, 4 – 5 septate. Herb. Sanderson 2406.
Opegrapha vulgata	Fx
Pertusaria leioplaca	Fx Tw
Porina aenea	Fx Coll. Three septate spores; involucrellum purple-brown, little change in K
Pyrenula chlorospila	Fx
Schismatomma decolorans	Fx
Xanthoria parietina	Fx Tw

Nearby Oak

Agonimia tristicula	Q

Photo 2018-05-17-02. **MO036**: an impressive ancient Ash, but highly polluted by ammonia.

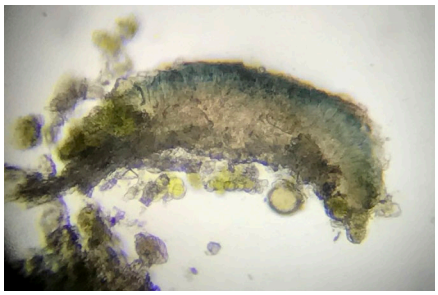
SO343 430

MO037 (SO34364 43080, 76m) ancient Oak
Rinodina roboris* var. *roboris Q

MO038 (SO34287 43060, 70m) (Tag 00128): ancient leaning Oak
***Lecidella* sp A** Q, Z1228. Coll. Parasitic on *Pyrrhospora quernea*; apothecia 0.1 – 0.2mm diameter, black, biatorine, flat; epithecium and upper hymenium blue-green, K + intensifying a bit; paraphyses lax, apices barely swollen; no spores found. Herb. Sanderson 2407

Other species
Laeviomyces pertusariicola Q, Z1087 (not *Roselliniella* sp A)
Pertusaria pertusa Q
Pyrrhospora quernea Q
Photos 2018-05-17-03 & 08

Photo 2018-05-17-02. **MO038**: a massive leaning Oak in the lower park, noticeably rich in this sheltered location than the polluted Oaks above. The undescribed ***Lecidella* sp A**, an apparently rare undescribed parasite of *Pyrrhospora quernea*.



Photos 2018-05-17-08. **MO038**: *Lecidella* sp A, a cross section in water.

SO341 431
To west generally poor

MO039 (SO34127 43118, 75m): ancient Oak

Cresponea premnea	Q	O

SO341 431

Species of Interest		
Cresponea premnea	Q	
Other Species		
Roselliniopsis tartaricola	Q, Z1075	SO3407 4313
Varicellaria hemisphaerica	Q	

SO340 430

MO040 (SO34022 43056, 78m): post mature Oak in open

Lecanora sublivescens	Q	R

A2.4 Main Meeting – Mid Slope of Park

On the lower slopes the open parkland grades in to denser pasture woodland, producing a mixture of field tree and woodland assemblages, with some very rich trees higher up the slope.

Photo 2018-05-17-04. The mid slope habitat, open parkland grading to more heavily treed pasture woodland.

MO041 (Tag 00207) (SO34006 43005, 85m): old Oak with dead wood

Lecanora sublivescens	Q	R
Ochrolechia arborea	LQ	

Mark also recorded

Catillaria nigroclavata	Q
Halecania viridescens	Q
Ochrolechia androgyna	LQ

SO340 430

Species of Interest

Calicium glaucellum	LQ
Lecanora sublivescens	Q
Ochrolechia arborea	LQ

Other Species

Flavoparmelia caperata	LQ
Lecanora conizaeoides f. *conizaeoides*	LQ, Tw
Ochrolechia androgyna	LQ
Parmelia saxatilis	LQ
Usnea subfloridana	Q Tw
Xanthoria polycarpa	Q Tw

SO339 429

MO042 (SO33930 42908, 106m): fallen Oak

Sphinctrina turbinata	Q, Z1087

Also

Pertusaria pertusa	Q

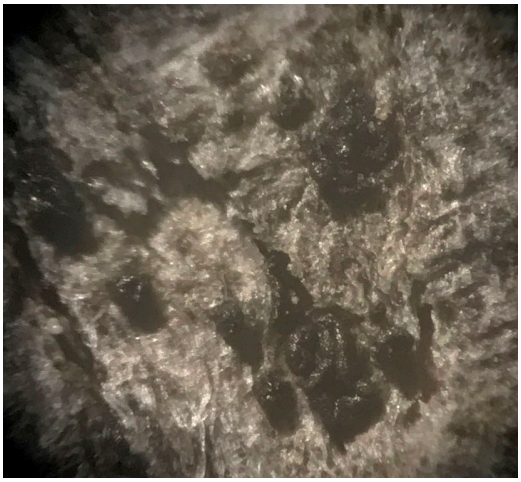
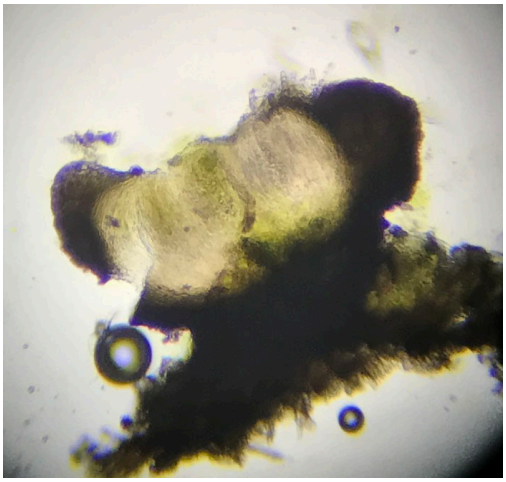
SO339 429
Species of Interest

Calicium glaucellum	Q
Sphinctrina turbinata	Q, Z1087

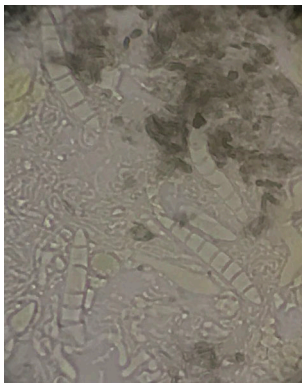
Other Species

Arthonia spadicea	Ae
Cladonia fimbriata	Q
Durella connivens	LQ Coll. SO33970 42984. Spores 25 – 38 x 5μm (3–) 6 – 7 septate; asci about 75 x 12μm. Herb. Sanderson 2408.

Photos 2018-05-17-09 – 12

Photos 2018-05-17-09 & 10: *Durella connivens* left apothecia, right apothecia cross section.

Photos 2018-05-17-11 & 12. *Durella connivens* left asci, right spores

Melanelixia subaurifera	Q Tw
Pertusaria pertusa	Q
Physcia aipolia	Q Tw
Physcia stellaris	Q Tw
Punctelia jeckeri	Q Tw
Punctelia subrudecta s. str.	Tw

SO339 428

MO043 (SO33984 42848, 106m): big Oak

Cresponea premnea	Q

SO340 428

MO044 (SO34036 42841, 102m): ancient Oak on edge of wood

Cresponea premnea	Q
Lecanora sublivescens	Q
Also	
Pertusaria flavida	Q

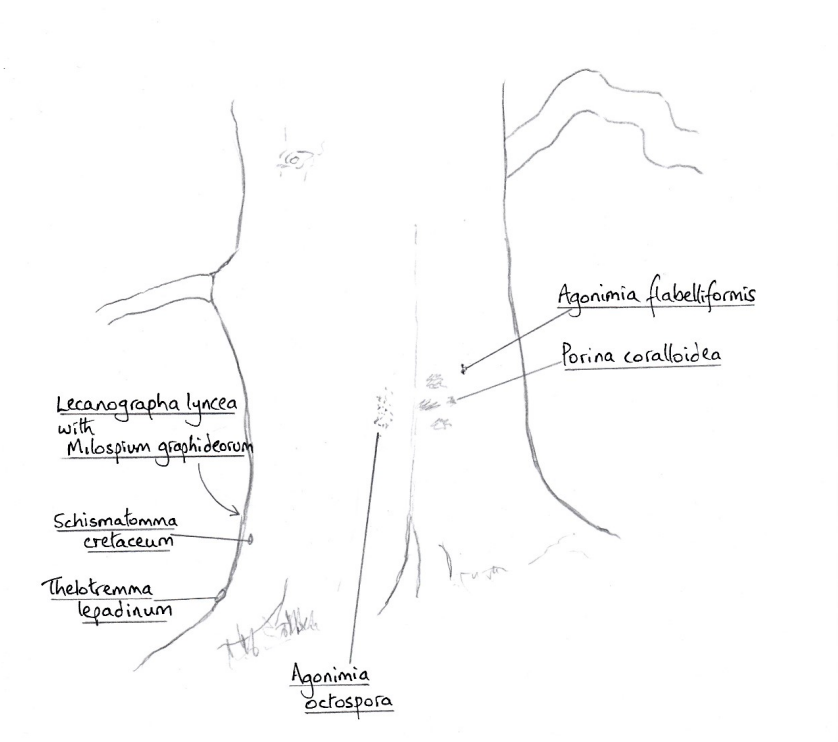
MO045 (SO34030 42815, 110m): a big *Quercus* x *rosacea* in wooded area

Agonimia flabelliformis	Q
Agonimia octospora	Q
Cresponea premnea	Q
Lecanographa lyncea	Q
Milospium graphideorum	Q, Z0600
Pachyphiale carneola	Q
Porina coralloidea	Q
Schismatomma cretaceum	Q
Thelopsis rubella	Q
Thelotrema lepadinum	Q
Also	
Bacidia rubella	Q
Normandina pulchella	Q
Opegrapha vermicellifera	Q Coll. Not *Lecanactis subabietina* (pycnidia K –)

Photo 2018-05-17-05

Photo 2018-05-17-05. **MO045**: a remarkable veteran Oak with a strong development of an oceanic woodland assemblage quite unlike that found in the open park below. Includes ***Agonimia flabelliformis***, ***Agonimia octospora***, ***Lecanographa lyncea***, ***Pachyphiale carneola***, ***Porina coralloidea***, ***Schismatomma cretaceum***, ***Thelopsis rubella*** and ***Thelotrema lepadinum***.

Massive oak at SO34029.42809 which was found to support perhaps the greatest diversity of notable lichens found on any tree at Moccas Park (Powell 2018).



Drawing of trunk of MO045 (Powell 2018).

SO340 428
Species of Interest

Agonimia flabelliformis	Q
Agonimia octospora	Q
Cresponea premnea	Q
Lecanora sublivescens	Q
Lecanographa lyncea	Q

Milospium graphideorum	Q, Z0600
Pachyphiale carneola	Q
Porina coralloidea	Q
Schismatomma cretaceum	Q
Thelopsis rubella	Q
Thelotrema lepadinum	Q
Other Species	
Bacidia rubella	Q
Dimerella pineti	Q
Normandina pulchella	Q
Opegrapha vermicellifera	Q

SO342 427

Schismatomma decolorans	Ae

A2.5 Main Meeting – Upper Slope of Park

The steep upper slopes have patches of more densely wooded pasture woodland as well as large glades. Wound tracks on Horse Chestnut and Maple support an exceptionally important assemblage along with an important outcrop of impure limestone with the only known English colony of ***Gyalecta ulmi***.

SO340 426

MO046 (Tag 07559) (SO34015 42578, 140m): old Maple

Bacidia incompta	Ac
Also	Ac
Caloplaca ulcerosa	
Dendrothele acerina	Ac

SO340 425

Species of Interest

Porina borreri	Ae SO34014 42575 spores 6 – 7 septate, 25 – 35 x 5μm. Herb. Sanderson 2409

Other Species

Opegrapha vermicellifera	Ae
Schismatomma decolorans	Ae

SO339 425

MO047 (SO33982 42563, 133m): ancient Oak on slope

Chaenotheca chrysocephala	Q
Chaenotheca trichialis	Q
Cresponea premnea	Q
Also	
Chaenotheca ferruginea	Q
Lecanactis abietina	Q
Lepraria ecorticata	Q

MO048 (SO33996 42539, 133m): post mature Oak

Bacidia biatorina	Q
Chaenotheca trichialis	Q

MO049 (Tag 07523) (SO33952 42531, 146m): old Maple

Bacidia incompta	Ac
Leptogium subtile	Ac
Ramonia dictyospora	Ac
Also	

Bacidia phacodes	Ac	
Gyalecta truncigena	Ac	Coll.
Opegrapha vermicellifera	Ac	

Old *Acer campestre* at SO33960.42532 (tag 07523) with a considerable colony of *Bacidia incompta*. The propped dead branch on the left side has *Gyalecta truncigena* and *Ramonia dictyospora*.

SO339 425
Species of Interest

Bacidia biatorina	Q	
Bacidia incompta	Ac	
Chaenotheca chrysocephala	Q	
Chaenotheca trichialis	Q	
Cresponea premnea	Q	
Leptogium subtile	Ac	
Ramonia dictyospora	Ac	

Other Species

Bacidia phacodes	Ac	
Chaenotheca ferruginea	Q	
Gyalecta truncigena	Ac	Coll.
Halecania viridescens	Q Tw	
Lecanactis abietina	Q	
Lepraria ecorticata	Q	
Opegrapha vermicellifera	Ac	
Usnea wasmuthii	Q Tw	

SO339 425

SO339 424
Rocks, including both impure limestone and sandstone

Peltigera horizontalis	SSd
Candelariella reflexa	Ct Tw
Cladonia pyxidata	SSd
Fuscidea lightfootii	Ct Tw
Graphis elegans	Ct Tw
Hypogymnia tubulosa	Ct Tw
Hypotrachyna revoluta s. str.	Ct Tw

SO339 424 & SO338 424

MO050 – 52 (SO33900 42460, SO33894 42490 & SO33895 42479, 190m): limestone outcrops with ***Gyalecta ulmi***, southernmost with large population and open but threatened by shade from Hawthorn, others smaller populations and shaded by Hawthorns

SO339 424
Species of interest

Gyalecta ulmi	SLm
Peltigera horizontalis	SLm

Other Species

Peltigera praetextata	SLm

SO338 424
Species of interest

Gyalecta ulmi	SLm

Photo 2018-05-17-06. **MO050**: part of a strong thallus of ***Gyalecta ulmi***, on the best lit limestone outcrop.

SO341 424
Other Species

Calicium viride	Q

SO341 425
Other Species

Arthonia spadicea	Q

A2.6 Main Meeting – Mid Slope of Park

Back into the mid slope zone and briefly worked along the pasture woodland/parkland interface. Found more significant woodland species, dry bark and dead wood species here, including a composite *Lecanographa amylacea*/*Buellia violaceofusca* thallus.

SO341 426

MO053 (SO34160 42620, 103m): fallen Oak
Chaenothecopsis nigra LQ Coll. One septate with dark septa

MO054 (SO34167 42705, 98m): big leaning Oak
Chaenothecopsis nigra LQ Coll. One septate with dark septa
Pachyphiale carneola Q
Also
Gyalecta truncigena Q

SO342 424

MO055 (Bird box 17A) (SO34260 42477, 110m): ancient Oak
Arthonia vinosa Q

SO343 425

MO056 (SO34384 42509, 110m): post mature Oak
Calicium salicinum Q, Z0429
Cresponea premnea Q
Lecanographa amylacea/Buellia violaceofusca Q Coll. Main thallus with brown fecks and contains trentepohlia type algae; soredia brownish-violet, abrading green, with a Trebouxia type algae.
Lecanora sublivescens Q
Also
Cliostomum griffithii Q
Photos 2018-05-17-13, 14 & 16

Photo 2018-05-17-16: ***Lecanographa amylacea*** / ***Buellia violaceofusca***, a composite thallus with ***Lecanographa amylacea*** in the lower right corner and ***Buellia violaceofusca*** soredia to the left.

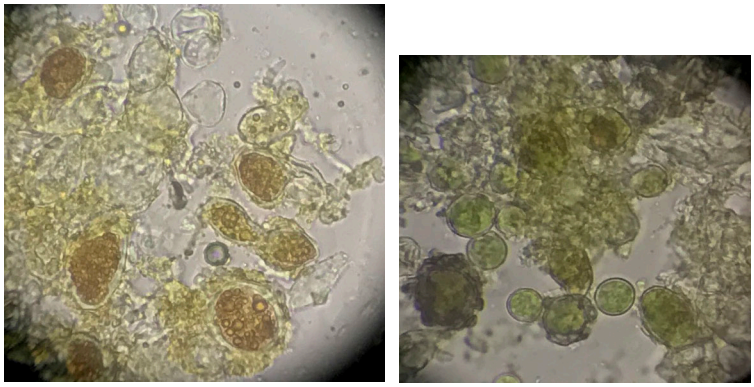


Photo 2018-05-17-13 & 14: ***Lecanographa amylacea*/*Buellia violaceofusca***, left thallus squash from main thallus with brown fecks and containing trentepohlia type algae. Right soredia squash, with a Trebouxia type algae.

SO3443 4256
Ophioglossum vulgatum

A3 Dave Lamacraft's Records, Moccas Park BLS

MO058 (SO3405242647 ±7m, 124m): *Aesculus*

Bacidia incompta	Ae	Trunk - dominant in weep of c2m below broken branch
Leptogium subtile	Ae	Exposed tree roots, around rot holes

Aesculus hippocastani (SO340.425) [MO058] with a wound track caused by the scar of a missing branch. This wound track supports a large colony of *Bacidia incompta* (Powell 2018).

The exposed roots of the *Aesculus hippocastani* shown above. The roots produce little potholes which form temporary pools with overflows, reminiscent of those found on old *Fagus* trees. Specimens of a tiny cyanolichen turned out to be *Leptogium subtile* rather than its rarer look-

alike *Collema fragrans*. Specimens of *Porina* collected from such exposed Aesculus roots were considered likely candidates for *P. byssophila* in the field but proved to be *P. borreri* (Powell 2018).

MO059 (SO3436143094 ±7m, 85m): *Quercus*

Rinodina roboris	Q
Also	
Arthonia pruinata	Q
Ochrolechia subviridis	Q

MO060 (SO3428543119 ±3m 74m): *Quercus* (tag lost)

Cresponea premnea	Q
Also	
Arthonia pruinata	Q
Varicellaria hemisphaerica	Q

MO061 (SO3436942824): Quercus

Cresponea premnea	Q
Also	
Varicellaria hemisphaerica	Q

MO062 (SO3403242621 ±5m, 123m): Aesculus

Bacidia incompta	Ae Trunk - dominant in weep of c2m below broken branch
Also	
Opegrapha varia	

MO063 (SO3441942444 ±3m, 119m): *Quercus* - ancient, half hollow

Cresponea premnea	Q
Opegrapha corticola	Q
Rinodina roboris	Q
Thelopsis rubella	Q

SO3431243126 Quercus - young

Anisomeridium biforme	
Arthonia radiata	

SO339 424, Hawthorn twigs (near Gyalecta ulmi)

Arthonia radiata	Ct Tw
Candelariella reflexa	Ct Tw
Evernia prunastri	Ct Tw
Fuscidea lightfootii	Ct Tw
Graphis elegans	Ct Tw
Hypogymnia tubulosa	Ct Tw
Hypotrachyna revoluta s. str.	Ct Tw
Melanohalea elegantula	Ct Tw
Parmelia sulcata	Ct Tw
Punctelia subrudecta	Ct Tw
Ramalina farinacea	Ct Tw

A3 David Hill's Records, Moccas Park BLS
Additional species to the list

Epiphytes

Opegrapha atra	Ap
Strigula taylorii	Ap

On the rocks at the Gyalecta ulmi site:

Agonimia tristicula	SLm	
Bilimbia sabuletorum	SLm	
Caloplaca chrysodeta	SLm	
Ochrolechia parella	SSd	
Pertusaria amara	SSd	
Porpidia cinereoatra	SSd	(+ test for confluentic)
Porpidia platycarpoides	SSd	(K+y>r)
Pyrrhospora quernea	SSd	
Trapelia coarctata	SSd	

A4 Mark Powell Records, Moccas Park BLS

See Marks notes and spreadsheet for much more detail. Additional sites of interest:

MO065 (SO3466 4281): ancient Sweet Chestnut
Chaenothecopsis nigra LCs

A magnificent *Castanea* {MO065] which, however (and typical of this host) supports a poor community of lichens. Most of the trunk is devoid of lichens though some crevices have small amounts of *Chrysothrix candelaris* and *Schismatomma decolorans*. Exposed lignum on the lower side of one of the large low branches supports a large colony of *Chaenothecopsis nigra* (Powell 2018).

A5 Paul F. Cannon Records, Moccas Park BLS

See species list spreadsheet for more detail. Additional sites of interest:

M0066 (SO3409 4311): young Oak
Arthopyrenia nitescens Q

A6 Nicola Bacciu Records, Moccas Park BLS

Nicola Bacciu added the following records:

Arthonia punctiformis	On an oak twig
Caloplaca cerinella	On elder and ash twigs
Lecania naegelii	Ash twigs
Lecanora carpinea	Ash twigs
Lichenodiplis lecanorae	Parasitizing *Caloplaca cerinella* on Ash

Rinodina sophodes Oak twig

A7 Juliet A Bailey Records, Moccas Park BLS

Additional species:

Candelaria concolor on beech trunk at SO3467 4248 at far eastern end, with Hyperphyscia, Phaeophyscia, etc. Probably the bit closest to intensive agriculture.
Caloplaca obscurella on an elder at about SO340421. I was pretty sure at the time that it was *C. obscurella* rather than *C. ulcerosa*. It wasn't fruiting, though.

Other Records:

Sweet chestnut branch
Lecanora chlarotera
Lecidella elaeochroma
Parmelia sulcata
Xanthoria parietina

Sweet chestnut trunk
Caloplaca cerinella. This is a surprise! I'm very familiar with cerinella, it is on every suitable tree (amongst which I would NOT put sweet chestnut.) I did not check the specimen microscopically; I suppose it might be cerinelloides. But it was certainly a tiny yellow Caloplaca looking like Glos cerinella.
Lecanora chlarotera
Lecanora expallens
Lecanora hagenii (queried in my notebook, but no note why. probably because I'm trying to work out the difference between *L. hagenii* and *L. persimilis*, if they are indeed different species)
Lecidella elaeochroma
Melanelixia subaurifera

Norway Maple trunk
Caloplaca cerinella (checked microscopically)
Lecania cyrtella
Physcia tenella

Norway maple branch
Physcia tenella

Maple
Arthonia pruinata
Lecania cyrtella
Lecania naegelii
Lecanora chlarotera
Lecidella elaeochroma
Physcia tenella
Xanthoria parietina

Beech trunk and base SO3467 4248
Arthonia radiata
Candelaria concolor
Hyperphyscia adglutinata
Lecanora chlarotera
Lecidella elaeochroma
Pertusaria albescens (didn't note the var.)
Pertusaria hymenea

Phaeophyscia orbicularis
Physconia grisea

Beech branch SO3467 4248
Caloplaca phlogina
Fuscidea lightfootii
Lecanora hagenii
Melanelixia glabratula
Melanelixia subaurifera
Melanohalea elegantula
Parmelia sulcata
Phlyctis argena
Physcia adscendens
Physcia tenella
Physconia grisea
Punctelia jeckeri
Punctelia subrudecta s. str.
Ramalina farinacea
Xanthoria parietina

Ash trunk
Candelariella reflexa

Hawthorn trunk
Evernia prunastri
Flavoparmelia caperata
Lecanora chlarotera
Lepraria incana s. str.
Opegrapha rufescens
Pertusaria amara

Hawthorn branch and twigs
Arthopyrenia punctiformis New to 2018
Lecanora carpinea
Lecanora chlarotera
Melanelixia subaurifera
Pertusaria pertusa
Usnea wasmuthii
Xanthoria parietina

Elder SO340421
Caloplaca obscurella
Candelariella reflexa
Melanelixia subaurifera
Parmelia sulcata
Phaeophyscia orbicularis
Phlyctis argena
Xanthoria parietina

Poplar
Lecania cyrtella
Lecania naegelii
Lecanora chlarotera
Xanthoria parietina

Oak branch
Parmelia saxatilis

Ramalina fastigiata

Horse Chestnut
Pertusaria hymenea
Phaeophyscia orbicularis
Phlyctis argena

Ash branch
Lecanora chlarotera
Phaeophyscia orbicularis
Physcia tenella
Rinodina oleae
Xanthoria parietina

A8 Tim Wilkins Records, Moccas Park BLS

MO067 (SO34291 43037): ancient Oak:
Bactrospora corticola the white crust with black pycnidia (17May) – yes from web images it does look like Bactrospora corticola. Brilliant! – no way was this keying out. Pycnidia 'regularly' scattered

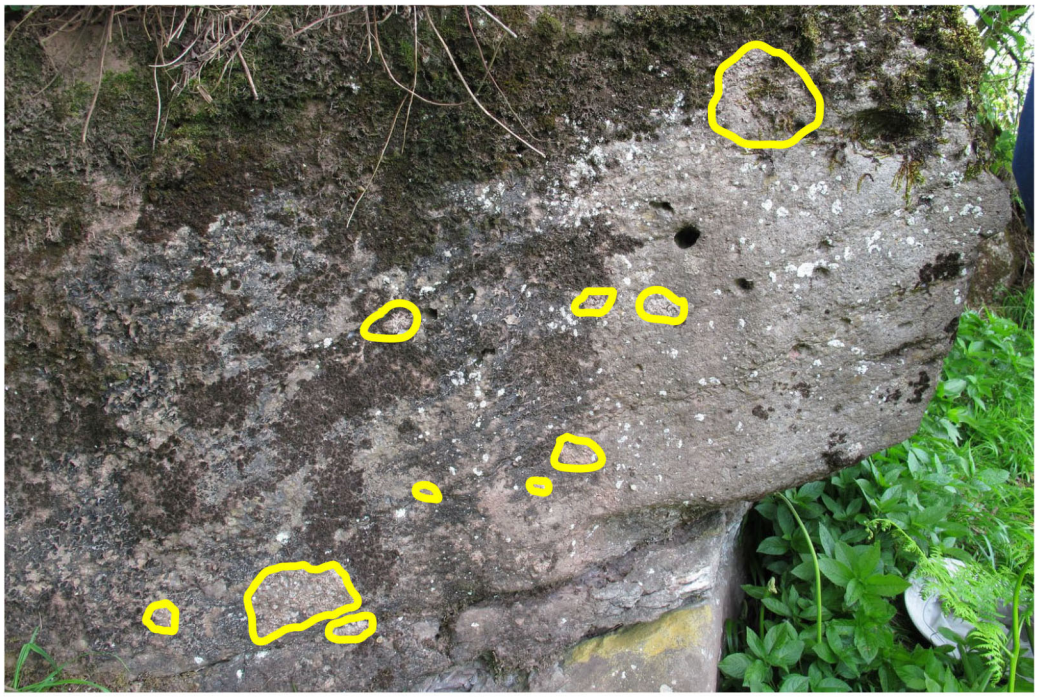
C-, UV-, Pd-, K+y thallus & pycnidia though subtle
Pycnidia blackberry-shaped under high pwr

LGBI 'ostiole gaping and torn' – saw this several times but wasn't sure it was a feature.

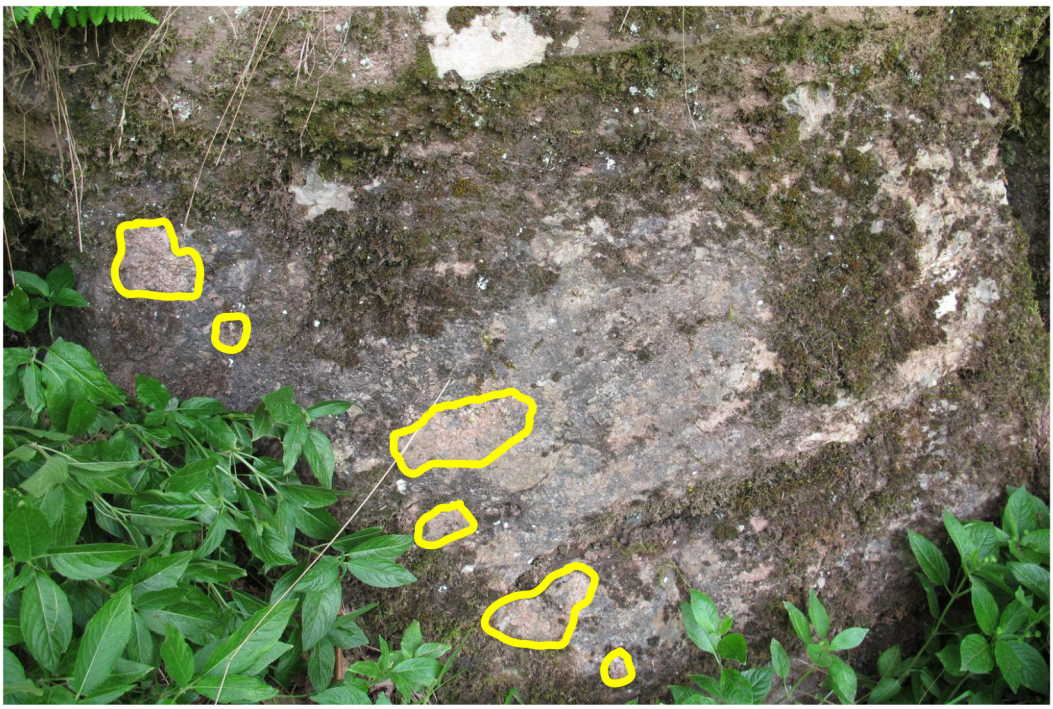
It was on one of the ancient oaks – same line as Old Man of Moccas, close to the tree with *Lecidella* that parasitises *Pyrrhospora quernea*. The geotag is SO 34291 43037.

MO068 (SO34151 43066): ancient Oak:
Buellia hyperbolica, 17 May - On lignum of fallen bough of ancient oak at SO.34151.43066 +/- 6m. Tree tag 174. Small amount (approx 0.5 x 0.5 cm) on exposed upper side of bough.

A9 Steve Price *Gyalecta ulmi*, Photographs Moccas Park BLS



Moccas Park Gyalecta ulmi on E facing side of outcrop at SO3389442481 17 May 2018 photograph and mark-up by Steve Price



Moccas Park Gyalecta ulmi on E facing side of outcrop at SO3389442481 17 May 2018 photograph and mark-up by Steve Price

Location MO052

Moccas Park Gyalecta ulmi on N facing side of shaded outcrop at SO3389542498 17 May 2018 photograph and mark-up by Steve Price

Location MO051

Moccas Park Gyalecta ulmi on main outcrop at SO3390742468 17 May 2018 photograph by Steve Price

Location MO050

ANNEX 2 Species List

General Key

Species
s. str. = In the strict sense, a recently split up species, recorded in the new tighter definition
s. lat. = In the loose sense, a species previously recorded on a wider definition than now and subsequently split up

SOWI
1 = Species used to calculate the Southern Oceanic Woodland Index (based on the former NIEC with minor modifications)

Conservation Status
EN = Endangered Red Data Book species
VU = Vulnerable Red Data Book species
NT = Near Threatened Red Data Book species
Nb = Notable species (NR, NS or IR species of conservation significance not RDB NT or higher)
NR = Nationally Rare
NS = Nationally Scarce
IR = International Responsibility species
S41 = Section 41species
[NS] = Nationally Scarce lichenicolous fungus (fungal parasite of a lichen), likely to be very under recorded
{NS} = Nationally Scarce species not regarded as a Notable species, an under recorded, or ruderal, species of limited conservation significance
NE = Not evaluated

New VC
VC = New to Herefordshire VC36
NB = New to Britain

Substrates
1 = No substrate given assumed to an epiphyte, Ac = Maple, Ae = Horse Chestnut, Ap = Sycamore, Apl = Norway Maple, Co = Hazel, Cs = Sweet Chestnut, Fg = Beech, Fx = Ash, Pp = Poplar, Q = Oak, Sn = Elder, Sx = Sallow, U = Elm, SLm = Limestone, SSd = Sandstone, Cort = Corticolous, L = Lignum (as prefix) Lic = Lichenicolous, no host given, Lig = Lignicolous, no substrate given, Sax = Rock, Sax? = No substrate given assumed to be rock, w = twigs & branches & WT = Worked timber & T

Hosts for lichenicolous fungi: Z0242 = *Caloplaca cerinella*, Z0429? = sometimes appearing lichenicolous on *Cliostomum griffithii*, Z0578 = *Hypocenomyce scalaris*, Z0600 = *Lecanographa lyncea*, Z0639 = *Lecanora chlarotera*, Z0643 = *Lecanora conizaeoides* f. *conizaeoides*, Z0987 = *Flavoparmelia caperata*, Z1075 = *Varicellaria hemisphaerica*, Z1076 = *Pertusaria hymenea*, Z1087 = *Pertusaria pertusa*, Z1228 = *Pyrrhospora quernea* & Z1530 = *Xanthoria parietina*

SPECIES LIST 1

Species Recorded from Moccas park NNR

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Abrothallus microspermus		Z0987, Q		[NS]	VC
Acarospora fuscata	Sax?	SSd			
Acrocordia conoidea	Sax				
Acrocordia gemmata	1	Fx			
Agonimia flabelliformis		Q	1	Nb (NR)	VC
Agonimia octospora		Q	1	NT (NS/IR)	VC
Agonimia tristicula	Sax	Q, SLm			
Amandinea punctata	Fx, Q	Q, Apl			
Anisomeridium biforme	Q	Q			
Arthonia arthonioides	1			Nb (NS)	
Arthonia parietinaria		Z1530		[NS]	VC
Arthonia pruinata	Fx, Q	Q, Fx, Ac			
Arthonia punctiformis	1	Q Tw			

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Arthonia radiata	Fg	Fx, Apl, Fg			
Arthonia spadicea	Q	Q, Ae			
Arthonia vinosa	Q	Q	1		
Arthopyrenia analepta		Cs			
Arthopyrenia nitescens		Q		Nb (NS/IR)	VC
Arthopyrenia punctiformis		Ct Tw			
Aspicilia calcarea	Sax				
Bacidia bagliettoana	Sax				
Bacidia biatorina		Q	1		
Bacidia incompta	Ae, Ap, U	Ae, Ac		VU (NS/S41)	
Bacidia phacodes	Co	Ac			
Bacidia rubella	Co, Q	Q, Fx			
Bactrospora corticola		Q		Nb (NS)	VC
Baeomyces rufus					
Bilimbia sabuletorum	Sax	SLm			
Botryolepraria lesdainii	Sax				
Brianaria bauschiana	Sax?				
Buellia griseovirens	LQ	Apl			
Buellia hyperbolica		LQ		VU (NR/S41)	VC
Buellia schaereri		LQ			
Buellia violaceofusca		Q		NT (NR/IR/S41)	VC
Calicium glaucellum	1	LQ, Q			
Calicium salicinum	Q, Fg	Q, Z0429?			
Calicium viride	Q	Q			
Caloplaca cerinella		Fx Tw, Sm Tw, Cs, Apl			
Caloplaca chlorina	Sax?				
Caloplaca chrysodeta	Sax	SLm			
Caloplaca crenularia	Sax				
Caloplaca flavescens	Sax				
Caloplaca flavocitrina		Fx			
Caloplaca flavovirescens	Sax?				
Caloplaca lucifuga	Q	Q		VU (NR/ S41)	
Caloplaca obscurella		Sn			
Caloplaca phlogina		Q, Fg Tw		Nb (NS)	
Caloplaca saxicola	Sax				
Caloplaca ulcerosa		Fx, Ac			
Candelaria concolor	1	Fg			
Candelariella aurella f. aurella		SSd			
Candelariella reflexa	Fx, Sm	Q Tw, Ct Tw, Apl, Fx			
Candelariella vitellina f. vitellina	1	WT			
Candelariella xanthostigma	1				
Catillaria lenticularis	Sax	SLm			
Catillaria nigroclavata		Q		{NS}	VC
Catinaria atropurpurea	1		1		
Chaenotheca brunneola	1	LQ	1		
Chaenotheca chrysocephala	1	Q	1		
Chaenotheca ferruginea	Q	LQ, Q			
Chaenotheca trichialis	Q	Q	1		
Chaenothecopsis nigra		LQ, Q, LCs		Nb (NS)	
Chrysothrix candelaris	Fg, Fx, Q	Q, Cs, Fx			
Chrysothrix flavovirens	Q	LQ			
Cladonia coniocraea	Sax, Q	LQ			
Cladonia cryptochlorophaea		LQ		{NS}	
Cladonia digitata	1	LQ			

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Cladonia diversa	Q				
Cladonia fimbriata	Q	Q, LQ			
Cladonia furcata	1				
Cladonia furcata subsp. furcata	Sax				
Cladonia parasitica		LQ	1		
Cladonia polydactyla var. polydactyla	1	LQ			
Cladonia pyxidata	Sax, Fg	SSd			
Cladonia ramulosa	Sax				
Cladonia rangiformis	1				
Cladonia squamosa var. subsquamosa	1				
Clauzadea immersa	Sax?				
Clauzadea monticola	Sax	SLm			
Cliostomum griffithii	Fx, Q	Q			
Clypeococcum hypocenomycis		Z0578, LQ			
Collema crispum var. crispum	Sax?				
Collema tenax var. tenax	Sax?				
Cresponea premnea	Q	Q	1	Nb (IR)	
Cyphelium inquinans	1				
Cystocoleus ebeneus	Sax				
Dactylospora parasitica		Z1076, Q		[NS]	
Dendrothele acerina		Ac		NE	
Dimerella pineti	1	Q			
Dimerella tavaresiana		Q		Nb (NR)	
Diploicia canescens	Q	Q			
Diploschistes scruposus	Sax?				
Diplotomma alboatrum		Fx			
Diplotomma alboatrum	1				
Dirina massiliensis f. sorediata	Sax?				
Durella connivens		LQ			
Enterographa crassa	Q	Q			
Enterographa hutchinsiae	Sax				
Evernia prunastri	Fg, Fx, Q	Ct Tw, Q, WT, Apl, Ct			
Fellhaneropsis vezdae	1				
Flavoparmelia caperata	Fx, Q	LQ, Q Tw, Ct			
Fuscidea lightfootii	Fg, Fx	Ct Tw, Q Tw, LQ, Apl, Fg Tw			
Graphis elegans	1	Ct Tw			
Graphis scripta	Fg				
Gyalecta flotowii	Ac	Fx		NT (NS)	
Gyalecta jenensis var. jenensis	Sax				
Gyalecta truncigena	Fx, Q	Q, Ac, Fx			
Gyalecta ulmi	Sax	SLm		EN (NR/IR/S41)	
Haematomma ochroleucum var. porphyrium	Q				
Halecania viridescens		Q Tw, Q		{NS}	
Hyperphyscia adglutinata	Ae, Fx, Sx	Fx, Fg			
Hypocenomyce scalaris	Lig	LQ			
Hypogymnia physodes	Fg, Fx, Q	Q Tw, WT			
Hypogymnia tubulosa	Fg, Fx, Q	Ct Tw, WT			
Hypotrachyna afrorevoluta	Cort				
Hypotrachyna revoluta s. str.		Ct Tw			
Illosporiopsis christiansenii		Lic		[NS]	
Imshaugia aleurites	Lig	LQ, WT			
Ionaspis lacustris	Sax?				

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Laeviomyces pertusariicola		Z1087, Q			VC
Lecanactis abietina	Q	Q			
Lecania cyrtella	1	Fx Tw, Apl, Ac, Pp			
Lecania erysibe s. lat.	Sax				
Lecania naegelii		Q, Fx Tw, Apl, Ac, Pp			
Lecanographa amylacea	1	Q	1	VU (NS/IR/S41)	
Lecanographa lyncea		Q	1	Nb (IR)	
Lecanora aitema		WT			VC
Lecanora albescens	1				
Lecanora antiqua	Sax				
Lecanora argentata		Fx, Q Tw		{NS}	
Lecanora campestris subsp. campestris	Sax, Cort				
Lecanora carpinea	Fg	Fx Tw, Q Tw, Ct Tw			
Lecanora chlarotera	Fx, Q	Q, Q Tw, Cs Tw, Cs, Ac, Fg, Ct, Ct Tw, Pp, Fx Tw			
Lecanora confusa	Fg				
Lecanora conizaeoides f. conizaeoides	Lig	LQ, WT, Apl			
Lecanora crenulata	Sax?				
Lecanora dispersa	Sax				
Lecanora expallens	Fx, Q	Q, LQ, WT, Fx, Q Tw, Apl, Cs			
Lecanora gangaleoides	Sax				
Lecanora hagenii		Apl, Cs, Fg Tw			VC
Lecanora intumescens	1				
Lecanora orosthea	Sax?				
Lecanora polytropa	Sax	SSd			
Lecanora pulicaris	Fx, Tw	LQ, WT			
Lecanora quercicola		Q	1	VU (NS/IR/S41)	
Lecanora saligna	LQ	LQ			
Lecanora soralifera	Sax?				
Lecanora sublivescens	Q	Q, Fx	1	NT (NS/IR/S41)	
Lecanora sulphurea	1	SSd			
Lecanora symmicta	1	WT			
Lecanora varia	Q				
Lecidea grisella		SSd			VC
Lecidea nylanderi		LQ		Nb (NS)	VC
Lecidella elaeochroma f. elaeochroma	Fx	Fx, Apl, Cs Tw, Cs, Ac, Fg			
Lecidella scabra	Sax	SSd			
Lecidella sp A		Z1228 Q		NE (NR)	
Lecidella stigmatea	Sax?				
Lepraria ecorticata		Q		{NS}	VC
Lepraria incana s. lat.	Q, Fg, Q, Fx				
Lepraria incana s. str.		Q, LQ, Ct			
Lepraria lobificans	Cort				
Lepraria nivalis	Sax			{NS}	
Lepraria vouauxii	Sax	SLm			VC
Leptogium subtile		Ac, Ae		Nb (NS)	
Leptogium teretiusculum		SLm	[1]		
Lichenoconium lecanorae	Z0643			[NS]	VC
Lichenodiplis lecanorae		Z0242, Fx Tw			

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Marchandiomyces aurantiacus		Lic			VC
Melanelixia fuliginosa	1				
Melanelixia glabratula	Fg, Fx, Q	Fx, Q, Fg Tw			
Melanelixia subaurifera	Q, Fx, Sx	Q Tw, Apl, Cs, Fg Tw, Ct Tw, Sm			
Melanohalea elegantula	Fx	Q Tw, Fx, Fg Tw			
Melanohalea exasperata	1				
Melanohalea exasperatula		Q Tw			
Melanohalea laciniatula	Fx, Q				
Micarea denigrata	1	WT			
Micarea lignaria var. lignaria	Lig				
Milospium graphideorum		Z0600, Q		Nb (NS)	
Normandina pulchella	Fx	Q			
Ochrolechia androgyna	1	LQ			
Ochrolechia arborea		LQ, WT		NT (NR)	VC
Ochrolechia microstictoides		LQ			VC
Ochrolechia parella	Fx, Sax	SSd, Q			
Ochrolechia subviridis	Fg, Fx, Q	Q			
Ochrolechia turneri s. lat.	1				
Opegrapha atra	1	Ap			
Opegrapha calcarea	Sax				
Opegrapha corticola	Q	Q	1	Nb (IR)	
Opegrapha gyrocarpa	Sax?				
Opegrapha niveoatra	1				
Opegrapha ochrocheila	Q				
Opegrapha rufescens	1	Fx, Ct			
Opegrapha sorediifera	Q				
Opegrapha varia	Ac	Q, Ae, Ac			
Opegrapha vermicellifera	Ac	Ae, Q, Ac			
Opegrapha viridipruinosa		Fx		{NS}	VC
Opegrapha vulgata		Q			
Opegrapha xerica	Q			Nb (NS)	
Pachyphiale carneola		Q	1		
Parmelia saxatilis	Fg, Fx, Q	LQ, WT, Q Tw			
Parmelia sulcata	Fx, Q	Ct Tw, Q Tw, Apl, Cs Tw, Fg Tw, Sm			
Parmelina pastillifera	1				
Parmeliopsis ambigua	Ae				
Parmotrema perlatum	Sx				
Peltigera horizontalis	Sax	SSd, SLm	[1]		
Peltigera hymenina	Sax				
Peltigera membranacea	1				
Peltigera praetextata	Sax	SLm			
Peltigera rufescens	1				
Pertusaria albescens var. albescens	Fx, Q	Q, Fg			
Pertusaria albescens var. corallina	Fx, Q	Q			
Pertusaria amara f. amara	Fg, Fx, Q, Sax	Q, Fx, Ct			
Pertusaria amarescens	Sax?			Nb (NR)	
Pertusaria coccodes	Q	Q			
Pertusaria coronata		Q		Nb (NS)	VC
Pertusaria flavida	Q	Q, Fx			
Pertusaria hymenea	Fx, Q, Sax	Q, Fx, Fg, Ae			

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Pertusaria leioplaca	1	Fx Tw			
Pertusaria multipuncta	1		1		
Pertusaria pertusa	Fg, Fx, Q, Sax	Q, Ct Tw			
Pertusaria pseudocorallina	Sax?				
Phaeophyscia orbicularis	Fg, Fx, Q	Q, Apl, Fg, Sm, Ae, Fx Tw			
Phlyctis argena	Fx	Q, Fg Tw, Sm, Ae			
Physcia adscendens	Q	Q Tw, Fg Tw			
Physcia aipolia	1	Q Tw			
Physcia caesia	1				
Physcia stellaris		Q Tw			
Physcia tenella	Fg, Fx, Q	Q Tw, Q, Apl, Apl Tw, Ac, Fg Tw, Fx Tw			
Physcia tribacia	Fx, Q	Q			
Physconia distorta	1				
Physconia enteroxantha	Fx, Q	Q Tw			
Physconia grisea	Fx, Q	Q, Fg, Fg Tw			
Physconia perisidiosa	Q				
Piccolia ochrophora		Apl	1		
Placynthiella dasaea	Lig				
Placynthiella icmalea	Lig	LQ			
Platismatia glauca	Fg				
Polysporina simplex	Sax?				
Porina aenea	1	Fx, Ct			
Porina borreri		Ae		Nb (NS)	
Porina coralloidea		Q	1	Nb (NS/IR)	VC
Porina linearis	Sax				
Porpidia cinereoatra	Sax	SSd			
Porpidia crustulata	Sax?	SSd			
Porpidia macrocarpa f. macrocarpa	Sax				
Porpidia platycarpoides		SSd			VC
Porpidia tuberculosa	Sax				
Protoblastenia rupestris	1	SLm			
Protoparmelia oleagina		Q, LQ, WT		Nb (NS)	
Pseudevernia furfuracea s. lat.	1				
Pseudevernia furfuracea var. ceratea		WT			
Psilolechia lucida	Sax?				
Punctelia jeckeri	Fx, Sx	Q Tw, Fg Tw			
Punctelia subrudecta s. lat.	Fx, Q				
Punctelia subrudecta s. str.		Ct Tw, Q Tw, Fg Tw			
Pyrenula chlorospila	1	Fx			
Pyrrhospora quernea	Fg, Fx, Q	Q, Fx, SSd			
Ramalina farinacea	Fx, Q	Ct Tw, Q Tw, Fg Tw			
Ramalina fastigiata	Fx	Apl, Q Tw			
Ramalina fraxinea	Fx			Nb (IR)	
Ramonia dictyospora		Ac		NT (NS/IR/S41)	VC
Rhizocarpon reductum	1	SSd			
Rinodina exigua		Fx		NE	NB
Rinodina oleae	Fx, Q, Sax				
Rinodina oleae		Fx Tw			
Rinodina roboris var. roboris	Q	Q		Nb (IR)	

Species	1968-2002	2018	SOWI	Conservation Status	New VC
Rinodina sophodes		Fx Tw, Q Tw			
Rinodina teichophila	1				
Roselliniopsis tartaricola		Z1075, Q		[NS]	VC
Sarcogyne regularis		SLm			
Schismatomma decolorans	Q, Fx	Q, Fx, Ae, Cs			
Scoliciosporum chlorococcum	Fg, Fx				
Scoliciosporum umbrinum	1				
Sphinctrina turbinata	Lic, Q	Z1087, Q		Nb (NS)	
Sporodophoron cretaceum		Q		Nb (IR)	
Strigula taylorii		Ap		Nb (NS/IR)	VC
Syzygospora physciacearum		Lic		[NS]	VC
Tephromela atra var. atra	Sax				
Thelopsis rubella	1	Q	1		
Thelotrema lepadinum		Q	1		
Toninia aromatica	Sax				
Trapelia coarctata	Sax?	SSd			
Trapelia glebulosa	Sax				
Trapelia placodioides	Sax?				
Trapeliopsis flexuosa	LQ	LQ			
Trapeliopsis pseudogranulosa	Sax				
Tuckermannopsis chlorophylla	Q				
Unguiculariopsis thallophila		Z0639, Q Tw		[NS]	VC
Usnea ceratina	1		1		
Usnea subfloridana	Q, Fg	Q Tw			
Usnea wasmuthii		Q Tw , Ct Tw		{NS}	VC
Varicellaria hemisphaerica	Co, Q	Q			
Verrucaria baldensis	Sax				
Verrucaria caerulea	Sax				
Verrucaria dolosa		SLm			
Verrucaria hochstetteri	Sax?	SLm			
Verrucaria macrostoma f. furfuracea	Sax				
Verrucaria muralis	Sax				
Verrucaria nigrescens	Sax?				
Verrucaria viridula	Sax?				
Violella fucata	Fg	Q, WT			
Vouauxiella lichenicola		Fx, Z0685			
Xanthoria calcicola	Sax?				
Xanthoria parietina	Fg, Fx, Q	Q Tw, Apl, Cs Tw, Ac, Fg Tw, Ct Tw, Sm, Pp, Fx Tw			
Xanthoria polycarpa	Fx, Q	Q Tw, Apl			
Xanthoriicola physciae		Z1530, QTw			

Unconfirmed Old Records Not Listed Above

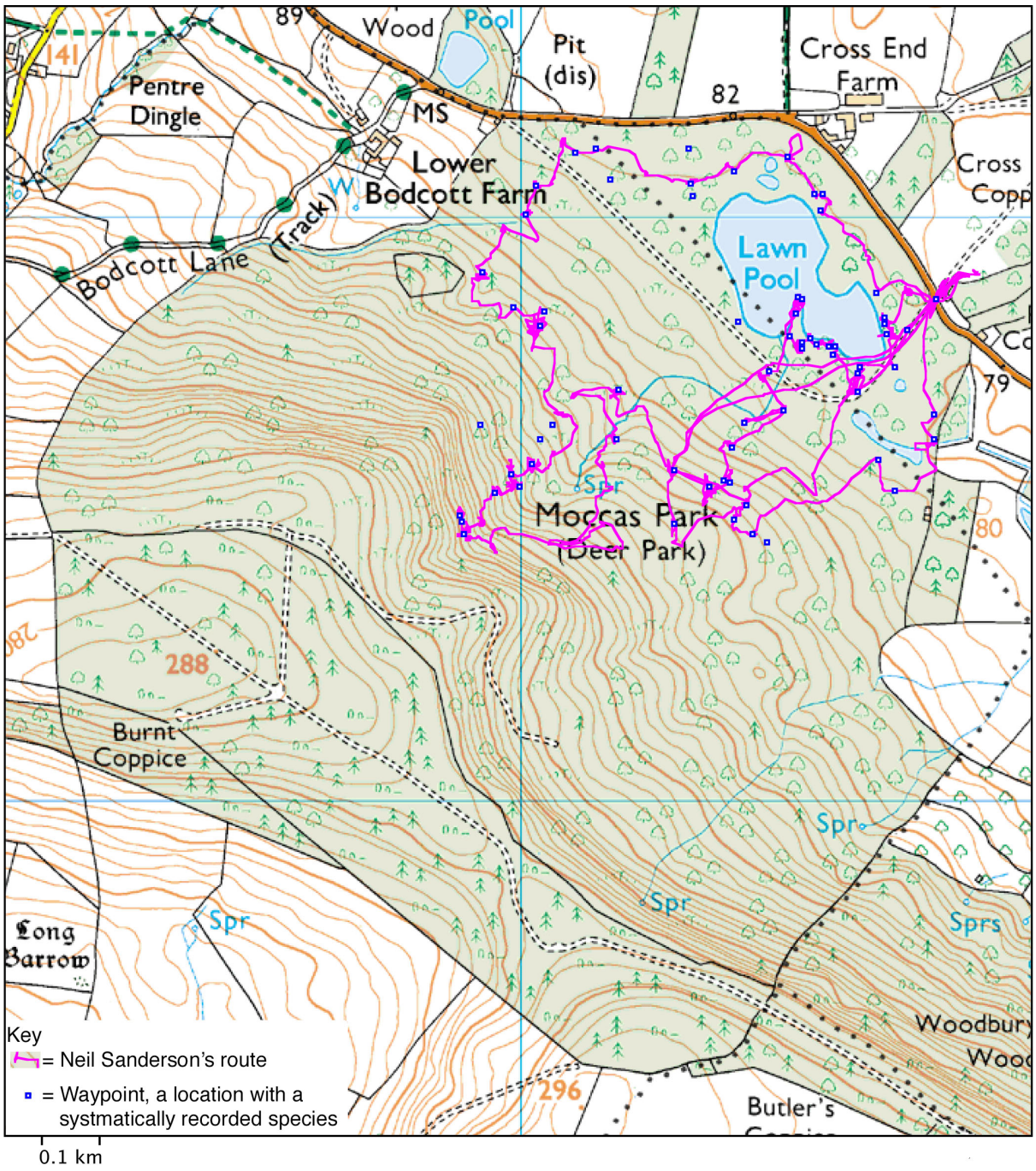
Species	Substrate	SOWI	Status	Comment
Cladonia chlorophaea s. lat.	Q, Sax			Only *Cladonia cryptochlorophaea* seen in 2018
Cladonia macilenta	Q			Near certain errors for *Cladonia polydactyla*
Lecanactis subabietinum	1	1	Nb (IR)	May be an error for *Opegrapha vermicellifera*
Lepraria membranacea	1			Error for *Lepraria vouauxii*?
Leptogium lichenoides	Sax	[1]		May have been *Leptogium pulvinatum*
Trapeliopsis granulosa	1			Likely error for *Trapeliopsis flexuosa*

Moccas Park NNR Biodiversity Measures	**1968-2002**	**2018**	**Total**
Total taxa	222	203	301
SOWI	12	19	22
Pinhead Index	7	8	8
Endangered	1	1	1
Vulnerable	3	5	5
Near Threatened	2	6	6
Notable	8	20	24
International Responsibility Species	7	15	16
S41	5	9	9
National Rare	3	8	9
National Scarce	9	28	31
TNTN Score	28	56	60

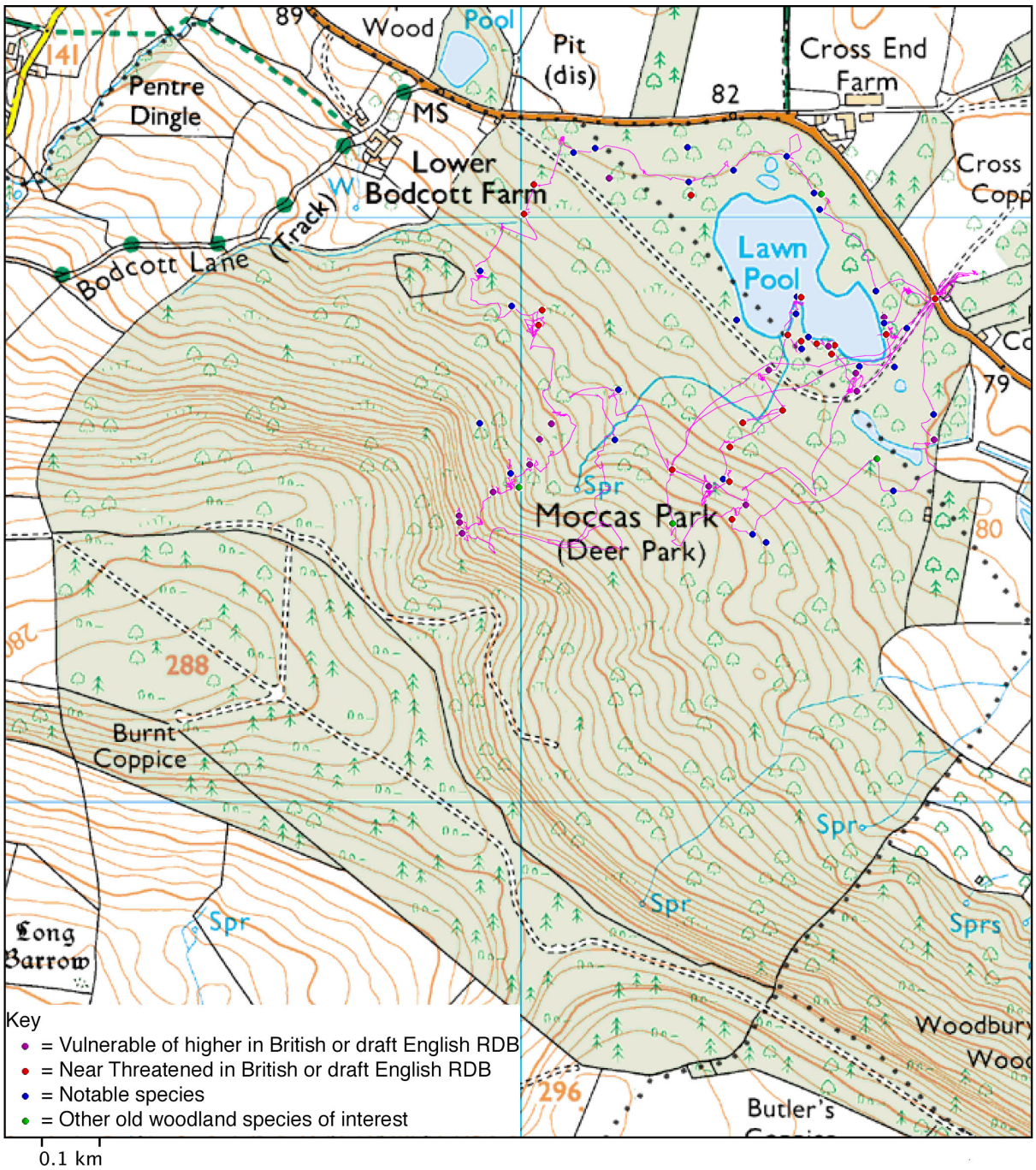
ANNEX 3 Maps

B1 General Maps

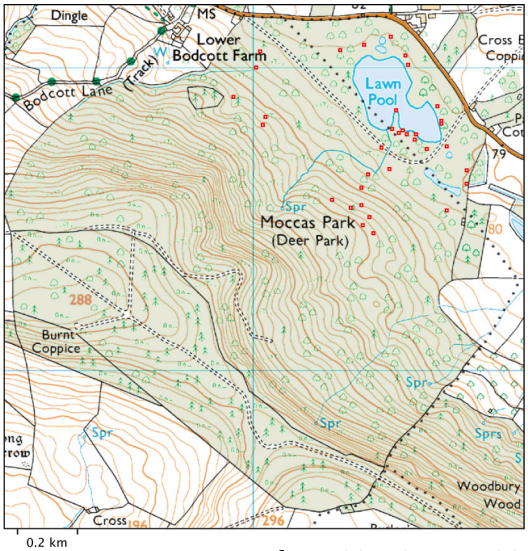
MAP 1
Moccas Park 2018 Survey



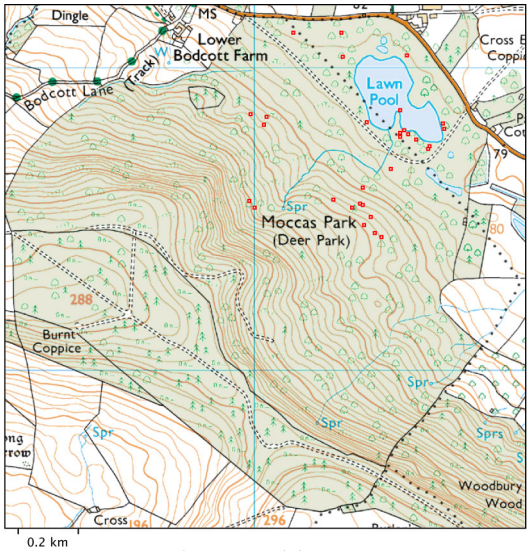
MAP 2
Moccas Park Conservation Value



B2 Assemblage Maps

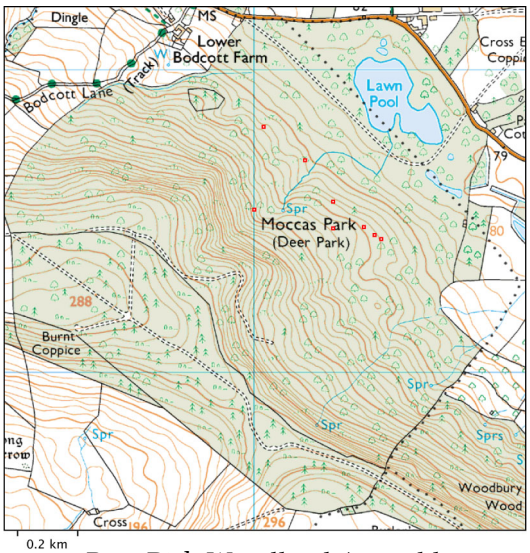


Map 3 Mesic – Base Rich Parkland Assemblage

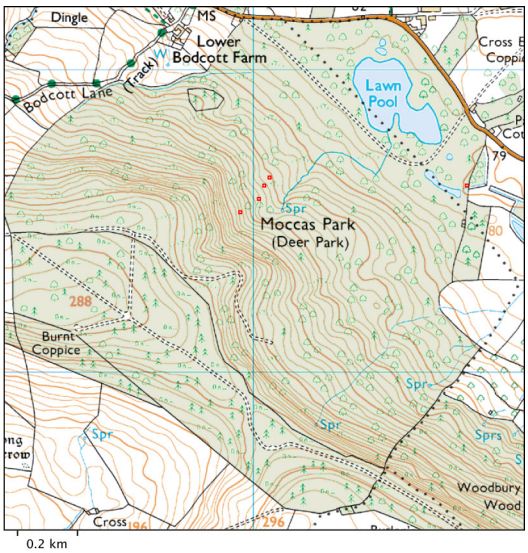


Map 4 Dry Bark Assemblage

Map 5 Lignum Assemblage

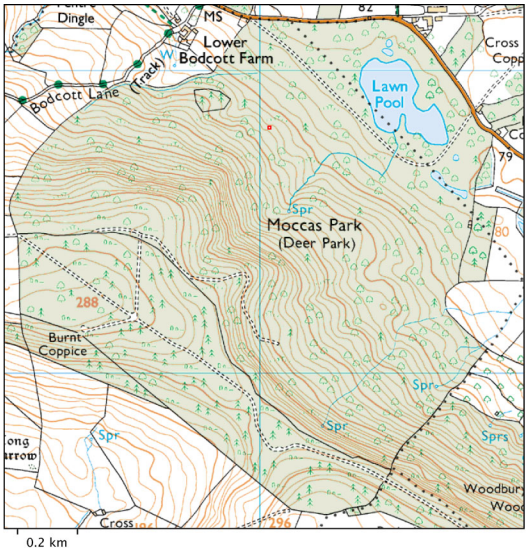


Map 6 Base Rich Woodland Assemblage



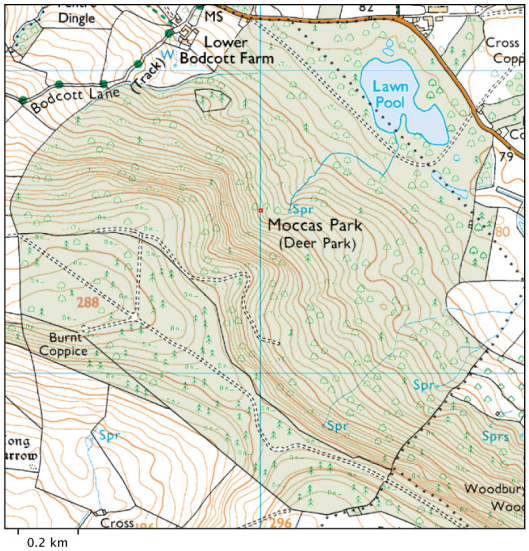
Map 7 Wound Track Assemblage

B3 Species Maps

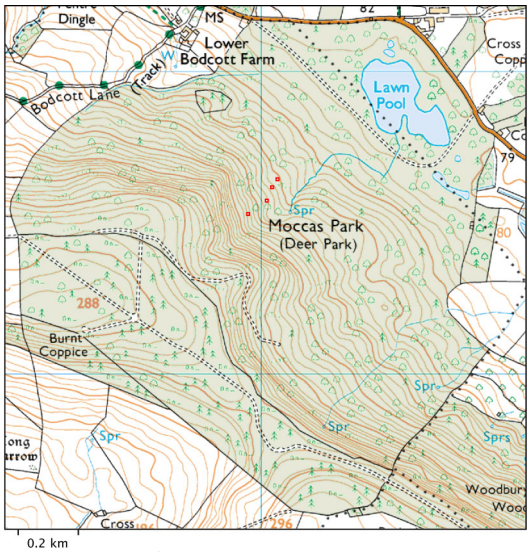


Map 8 *Agonimia flabelliformis, A. octospora, Lecanographa lyncea, Milospium graphideorum, Porina coralloidea, Schismatomma cretaceum, Thelotrema lepadinum*

Map 9 *Arthonia vinosa*

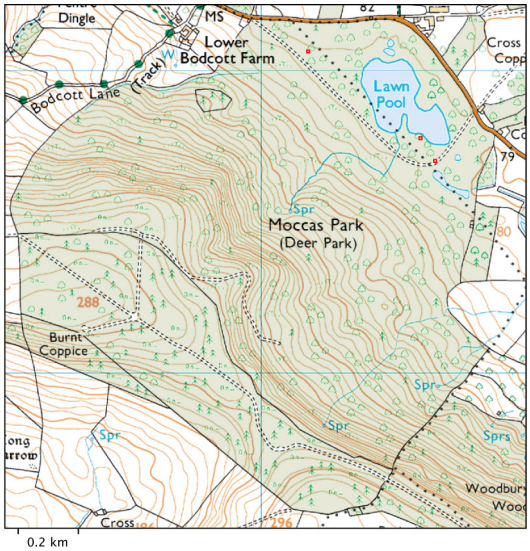


Map 10 *Bacidia biatorina*

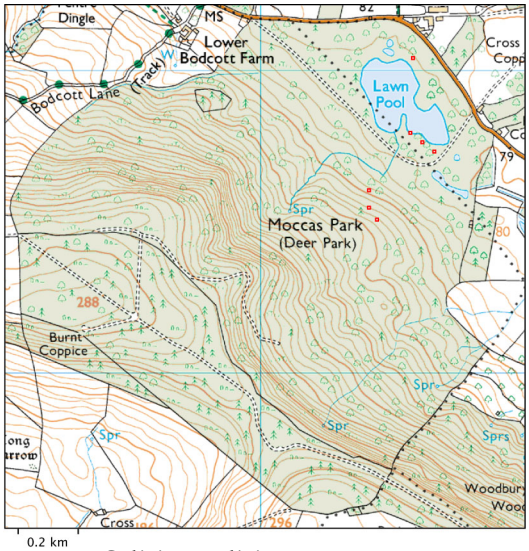


Map 11 *Bacidia incompta*

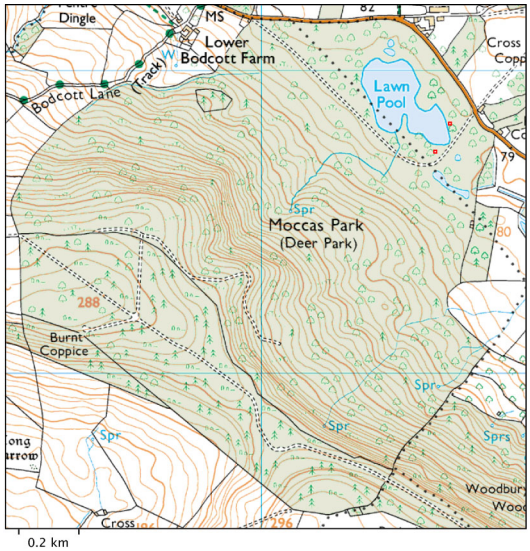
Map 12 *Bactrospora corticola*



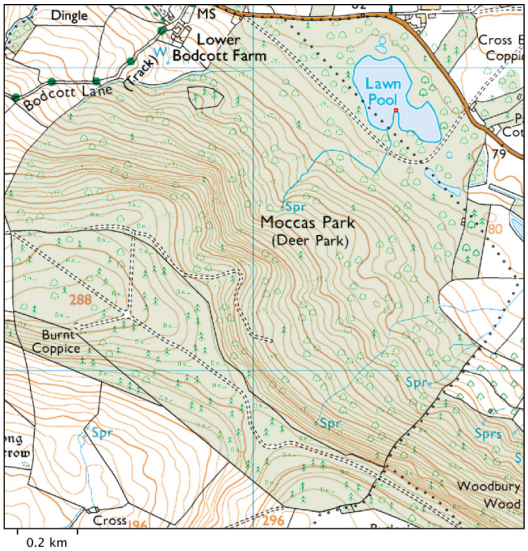
Map 13 *Buellia hyperbolica*



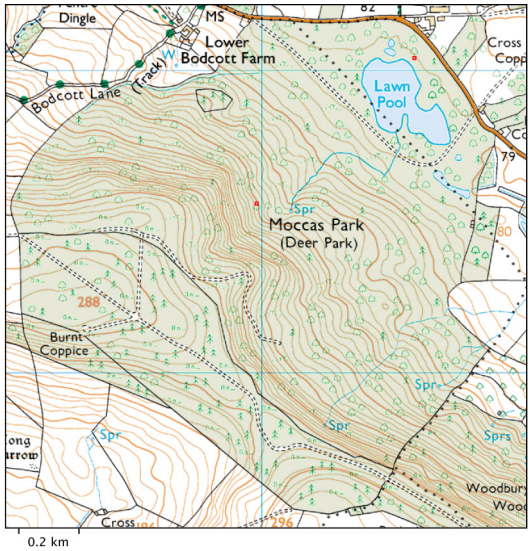
Map 14 *Calicium salicinum*



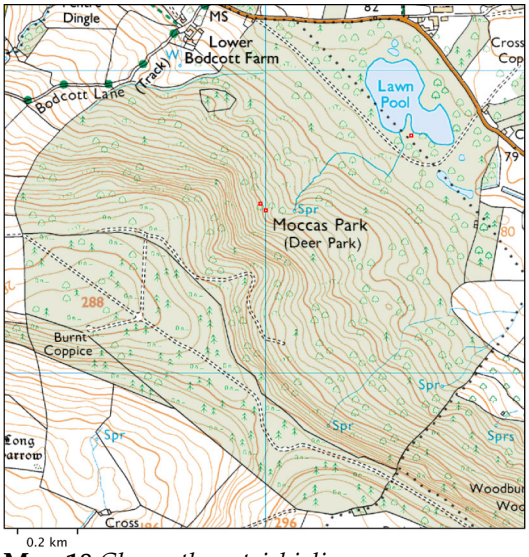
Map 15 *Caloplaca lucifuga*



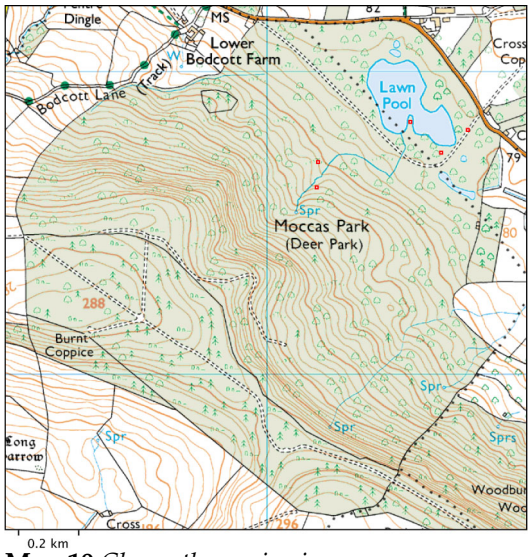
Map 16 *Chaenotheca brunneola*



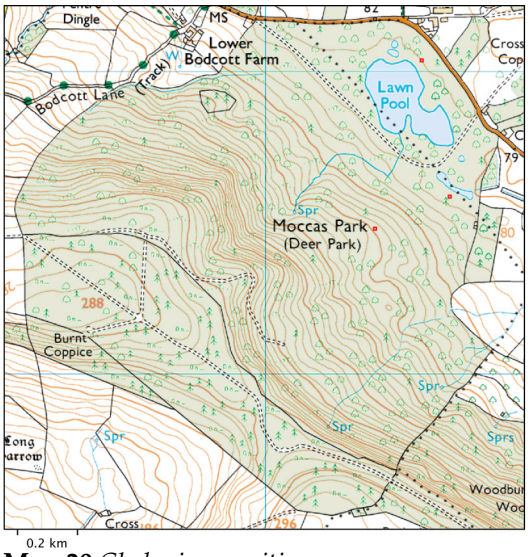
Map 17 *Chaenotheca chrysocephala*



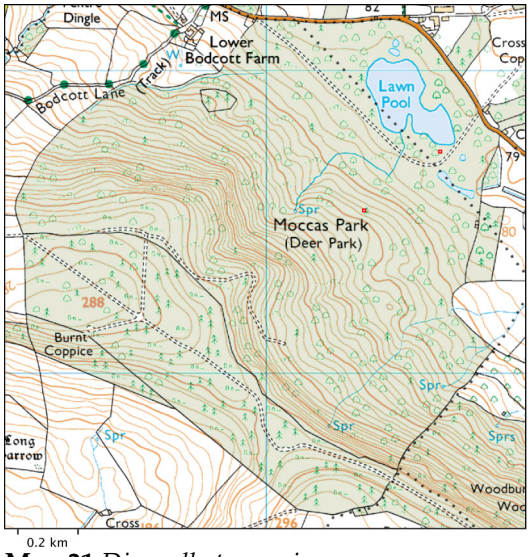
Map 18 *Chaenotheca trichialis*



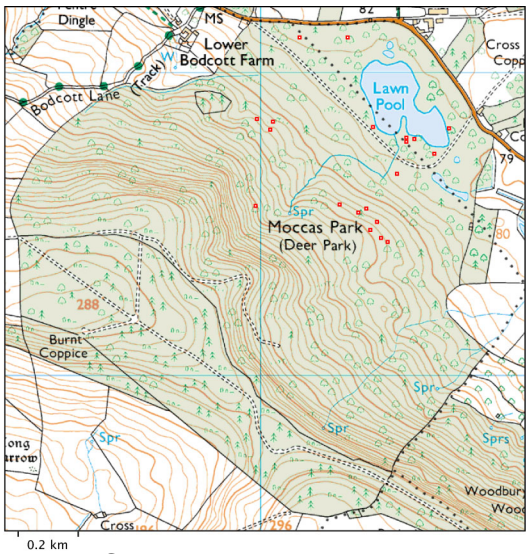
Map 19 *Chaenothecopsis nigra*



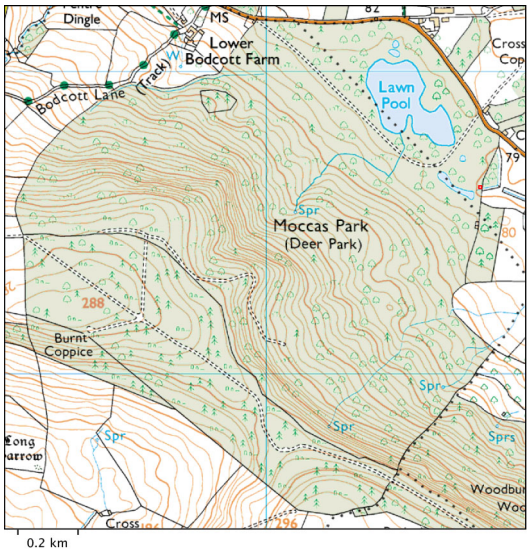
Map 20 *Cladonia parasitica*



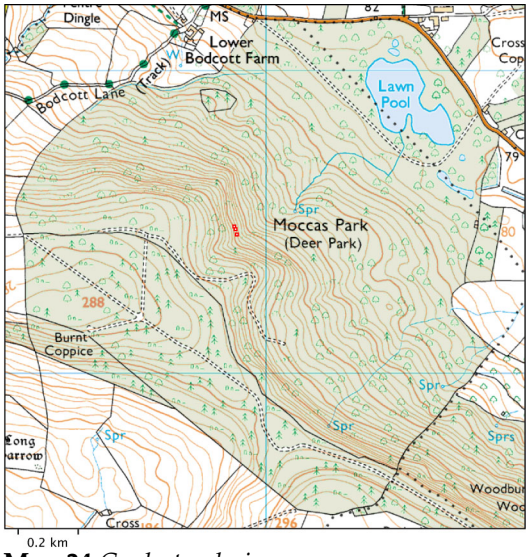
Map 21 *Dimerella tavaresiana*



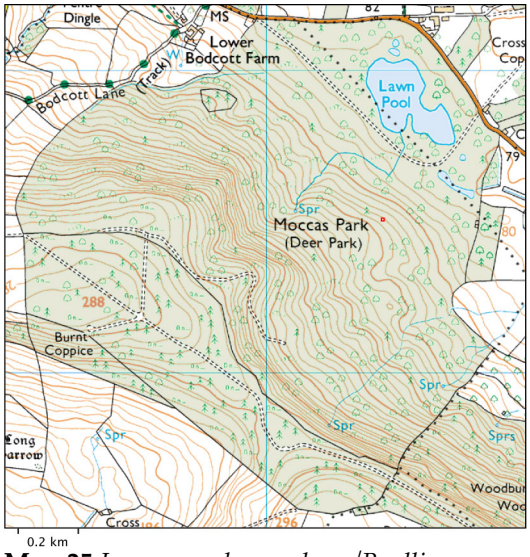
Map 22 *Cresponea premnea*



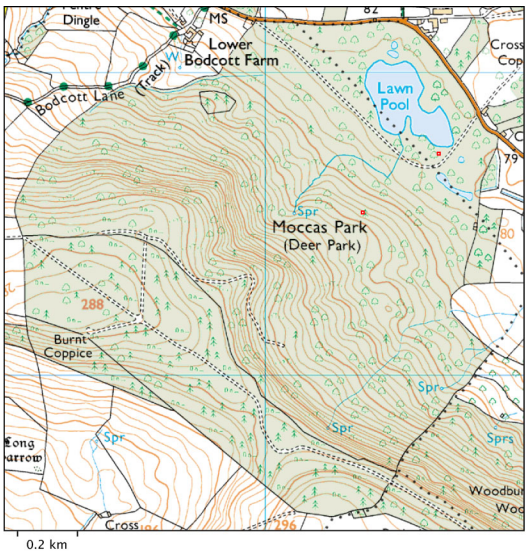
Map 23 *Gyalecta flotowii*



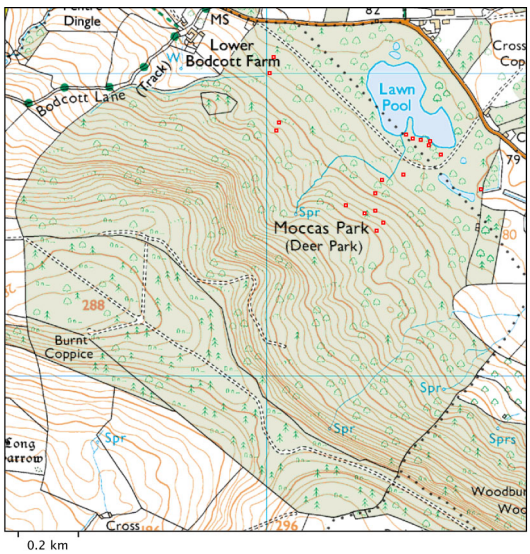
Map 24 *Gyalecta ulmi*



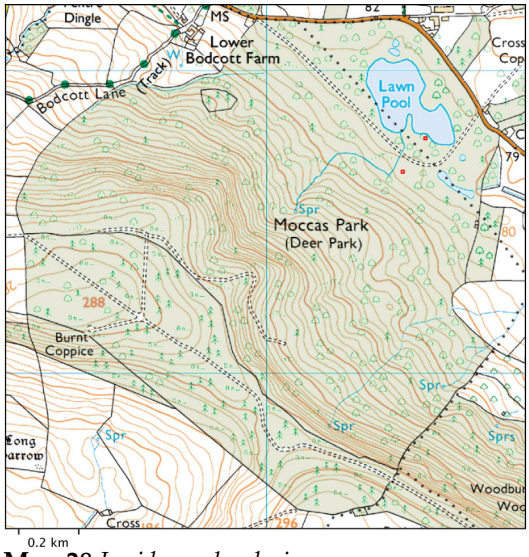
Map 25 *Lecanographa amylacea/Buellia violaceofusca*



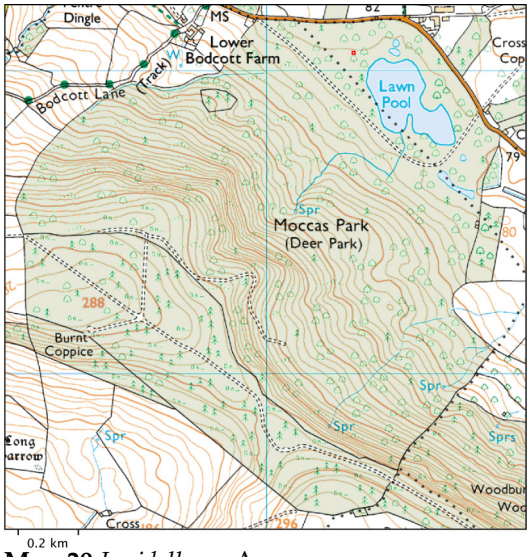
Map 26 *Lecanora quercicola*



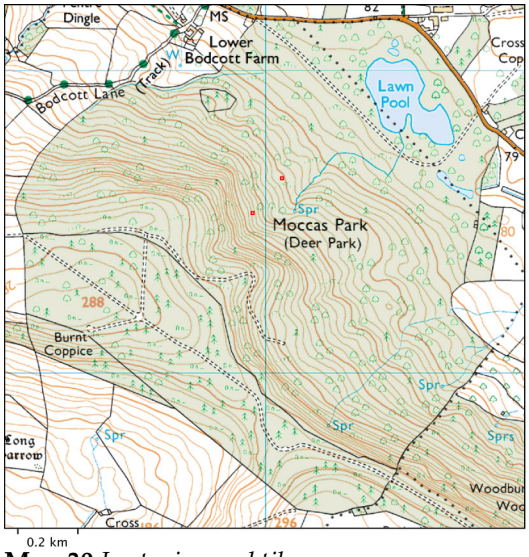
Map 27 *Lecanora sublivescens*



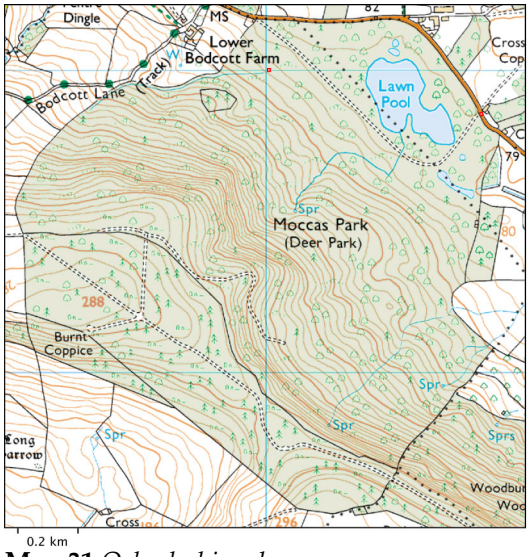
Map 28 *Lecidea nylanderi*



Map 29 *Lecidella* sp A

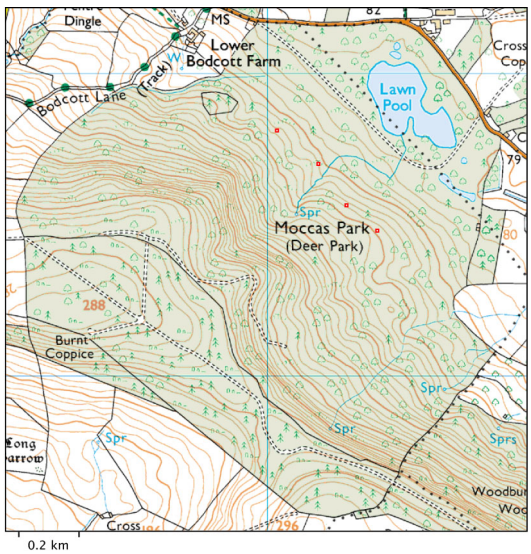


Map 30 *Leptogium subtile*

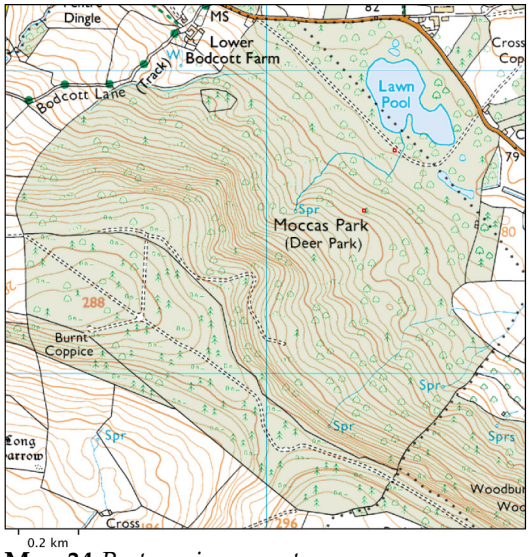


Map 31 *Ochrolechia arborea*

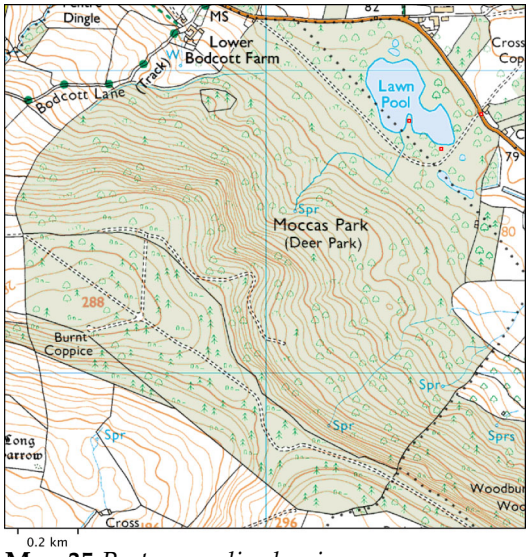
Map 32 *Opegrapha corticola*



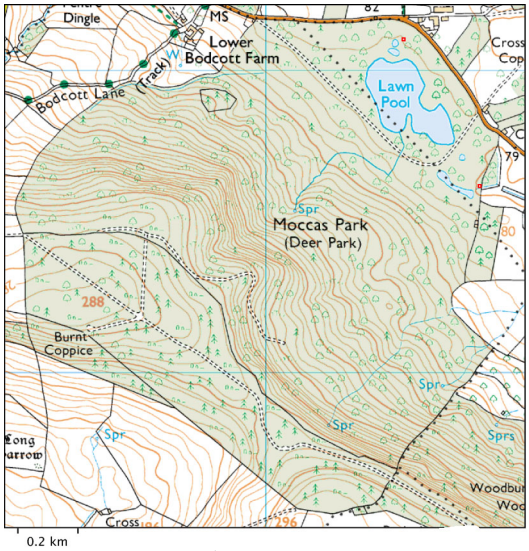
Map 33 *Pachyphiale carneola*



Map 34 *Pertusaria coronata*

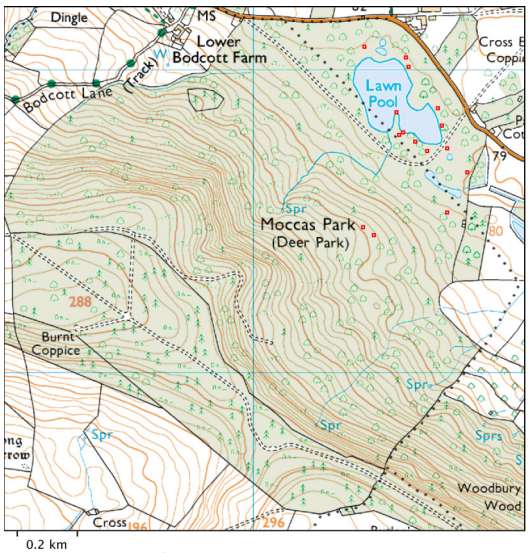


Map 35 *Protoparmelia oleagina*



Map 36 *Ramonia dictyospora*

Map 37 *Rinodina exigua*



Map 38 *Rinodina roboris var. roboris*

Map 39 *Sphinctrina turbinata*

Map 40 *Thelopsis rubella*

ANNEX 4; MARK POWELL'S REPORT

LICHENS AT MOCCAS PARK
A survey by BLS, Plantlife and English Nature, 16th and 17th May 2018
Attended by Nicola Bacciu, Juliet Bailey, Graham Boswell, Barbara Brown, Paul Cannon, Heather Colls, Shirley Hancock, David Hill, Alastair Hotchkiss, Geof Howe, Dave Lamacraft, Mark Powell, Steve Price, Maxine Putnam, Neil Sanderson, Paula Shipway, Tim Wilkins and Ray Woods.

Summary
NAS, provisional statement, 19th May 2018. My quick toting up is that, if all IDs correct, we got an NIEC index score of 18 and a score of 20 on the replacement SOWI index, away more than I hoped for.
MP, records received by 19th May 2018: 209 individual records of 135 separate confirmed taxa. The records include one IUCN Endangered species (*Gyalecta ulmi*), four IUCN Vulnerable species (*Bacidia incompta*, *Buellia hyperbolica*, *Caloplaca lucifuga* and *Lecanora quercicola*) and two IUCN Near Threatened species (*Lecanora sublivescens* and *Ochrolechia arborea*).


Fig. 1. Trunk of large oak tree (grid ref and tag?) supporting the IUCN Vulnerable *Caloplaca lucifuga*.

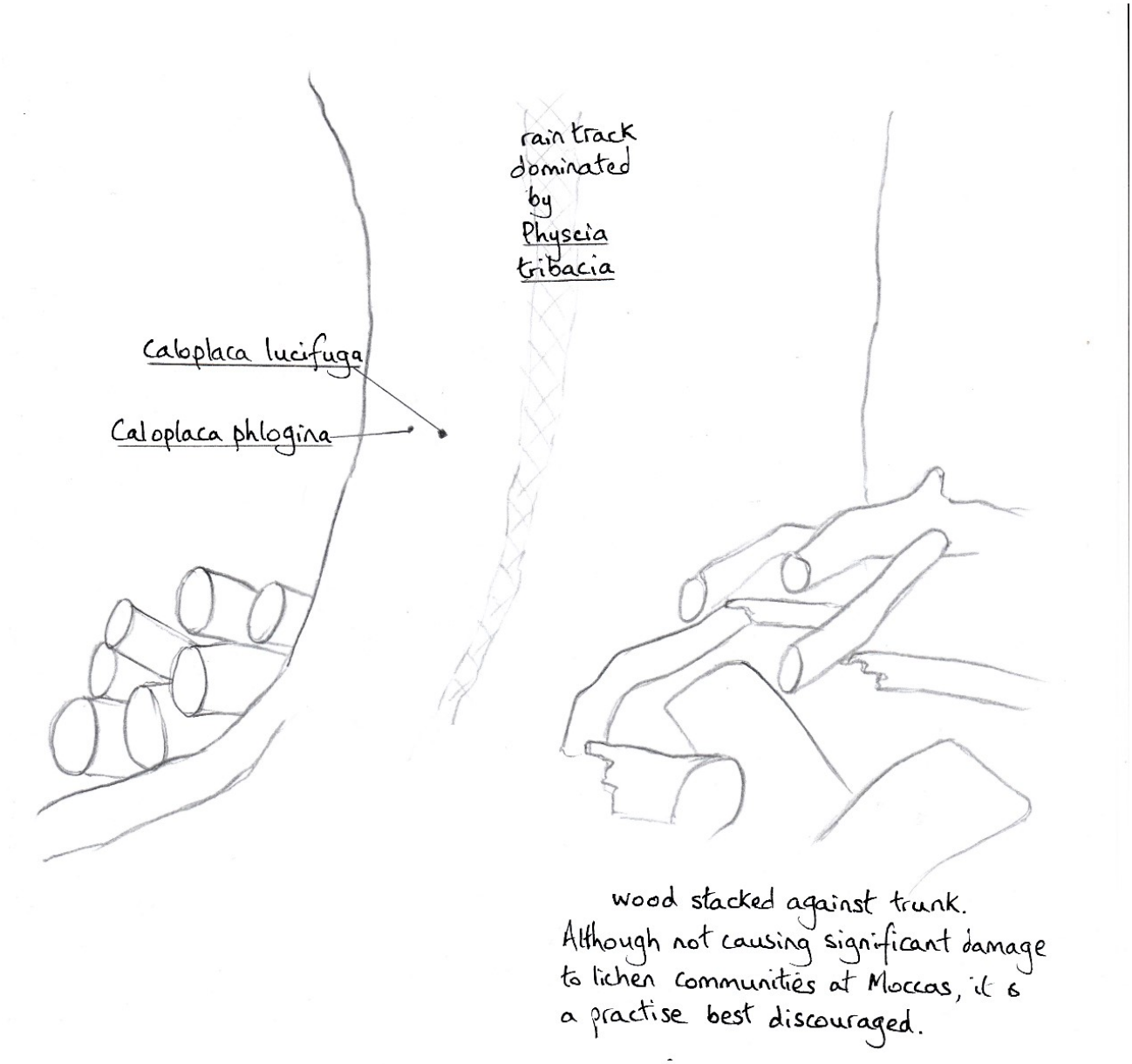


Fig. 2. Drawing of trunk shown in Fig. 1.

Fig. 3. A particularly interesting old oak tree at SO34572.42725 supporting *Caloplaca lucifuga*, *Dimerella tavaresiana*, *Lecanora quercicola* and *L. sublivescens*.

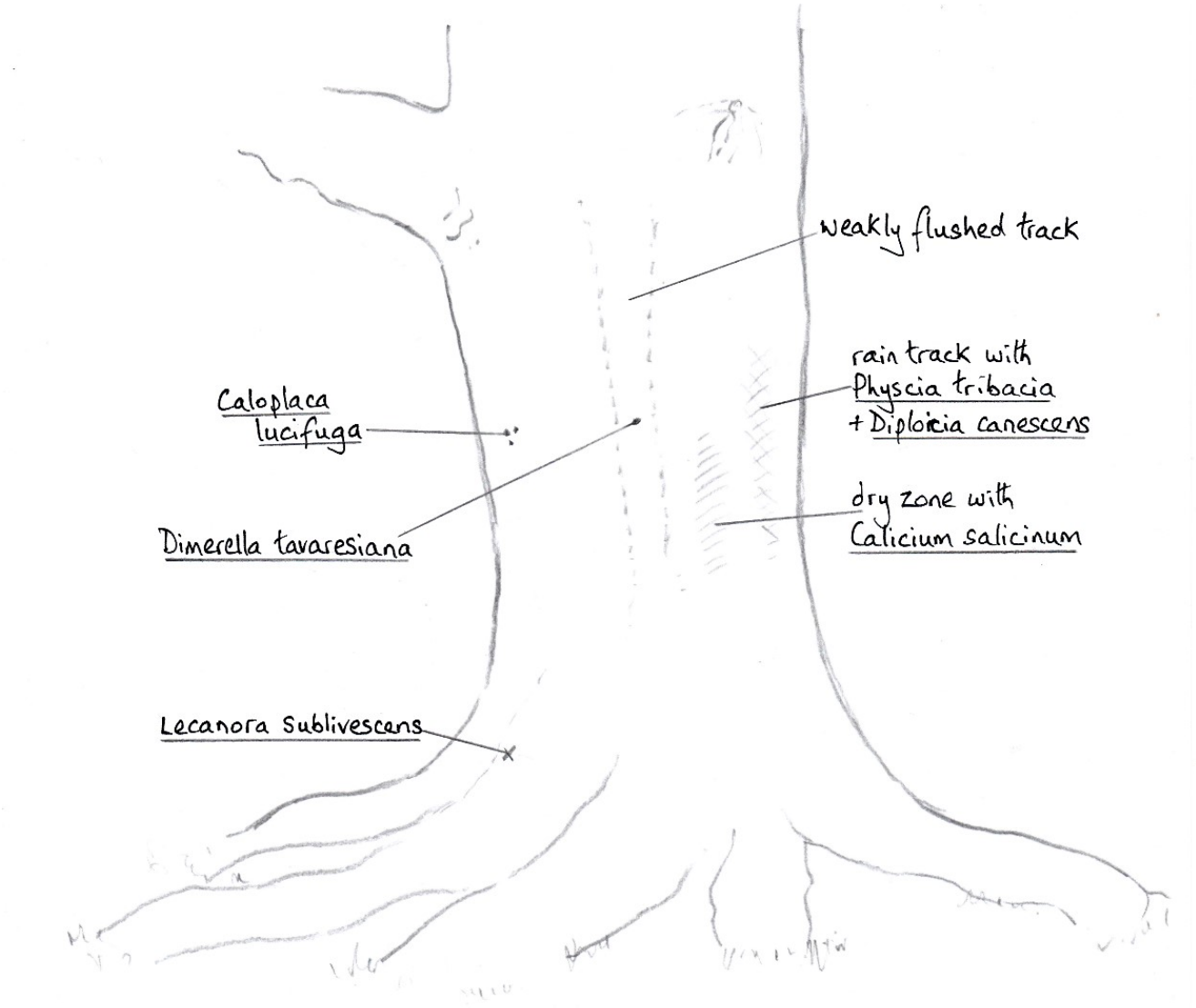


Fig. 4. Drawing of trunk shown in Fig. 3.

Fig. 5. Oak tree supporting a large patch of *Pertusaria coronata*.

Fig. 6. *Pertusaria coronata*, a great discovery by Nicola who recognised it as having a slightly different appearance to *P. coccodes* and with a K+ yellow (rather than K+ yellow turning red) reaction.

Fig. 7. Shattered oak at SO34450.42669 (tag 00292) with exposed lignum supporting *Lecidea nylanderi*.

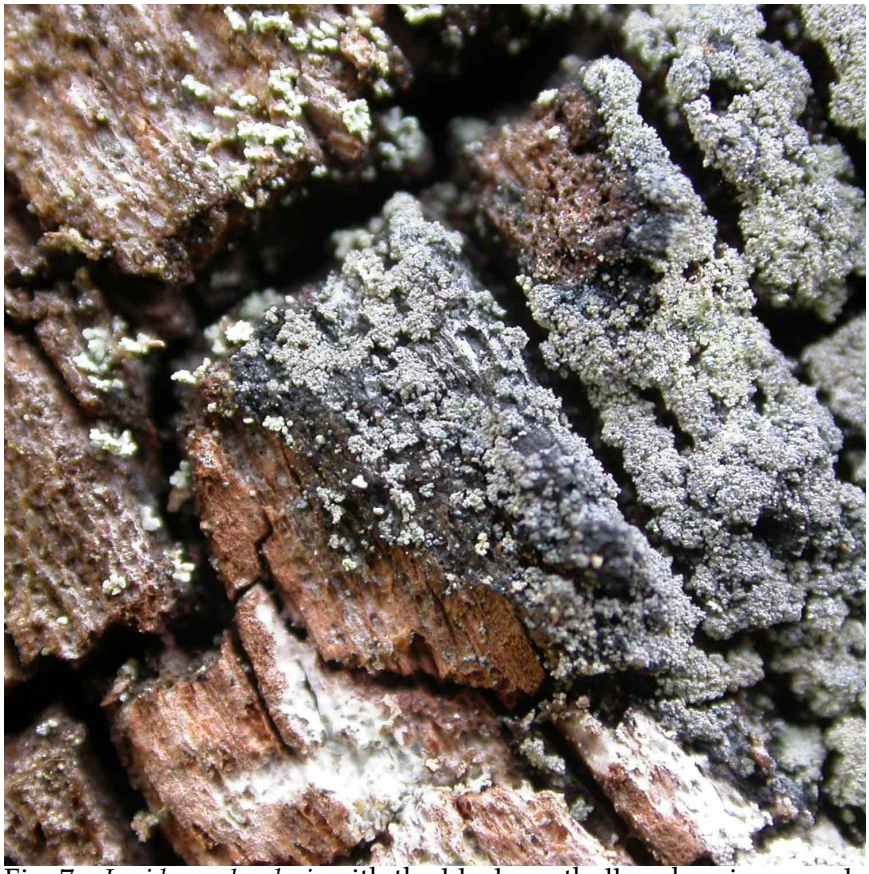


Fig. 7a. *Lecidea nylanderi*, with the black prothallus showing as a dark stain on the lignum.

Fig. 8. A moderately large oak tree (at SO34360.42539) which is of interest in supporting a range of parkland lichen species including *Lecanora sublivescens*. It is useful to know that *L. sublivescens* can colonise trees which are not ancient suggesting that the continuity of some significant species may be achieved in the long term.

Fig. 8a. *Lecanora sublivescens*.

Fig. 9. *Chaenothecopsis nigra* is usually found on lignum but was found on 'bleached' bark of this veteran *Quercus*.

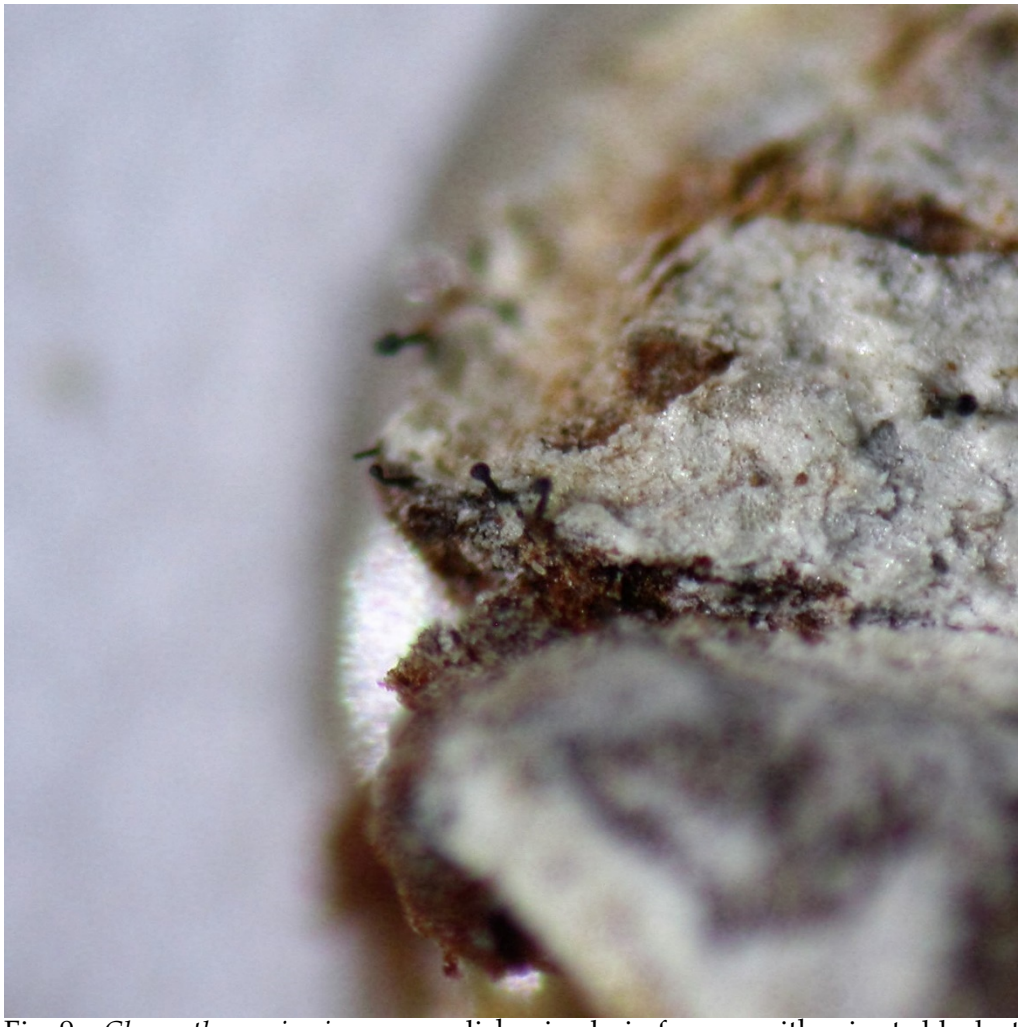


Fig. 9a. *Chaenothecopsis nigra*, a non-lichenized pin fungus with minute black stalked fruiting bodies.

Fig. 10. The entrance gate (SO34705.42860) flanked by park pales. The park pales are rather disappointing with thinly developed lichen crusts dominated by *Lecanora conizaeoides*, *L. expallens* and *L. pulicaris*. The gate rails support a much more exuberant and diverse lichen community which includes *Hypogymnia physodes*, *H. tubulosa*, *Imshaugia aleurites*, *Ochrolechia arborea*, *Protoparmelia oleagina*, *Pseudevernia furfuracea* and *Violella fucata*. I suspect that there is a reason why gates are often, as here, found to have richer lichen communities than on adjacent fencing. The park pales here are set in the ground and so there is easy access to molluscs. The gate has no such direct access for browsing molluscs. Apart from some grass which reaches the gate stiles, the route taken by any mollusc would involve climbing the gate posts and traversing iron gate fittings.

Fig. 11. A Norway Maple near the entrance gate (tag 01263). Despite being an introduced species, *Acer platanoides* is proving to be a good host for lichens which favour base-rich bark and it may be a good substitute for Fraxinus. The tree shown here has a weak rain-track in which a colony of *Piccolia ochrophora* is present.

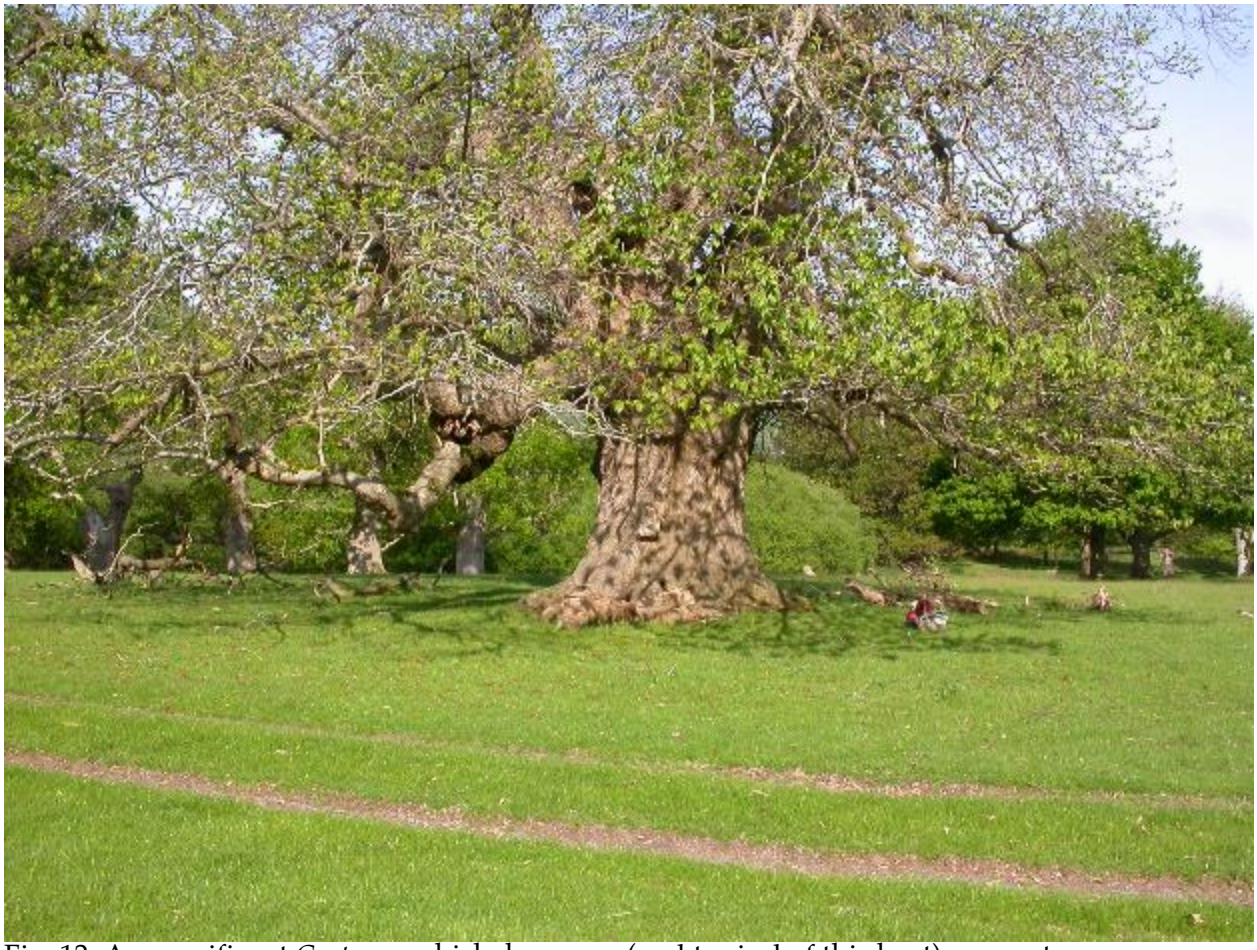


Fig. 12. A magnificent *Castanea* which, however (and typical of this host) supports a poor community of lichens. Most of the trunk is devoid of lichens though some crevices have small amounts of *Chrysothrix candelaris* and *Schismatomma decolorans*. Exposed lignum on the lower side of one of the large low branches supports a large colony of *Chaenothecopsis nigra*.

Fig. 13. Leaning veteran oak at SO34284.43057 (tag 00128) of interest for its large population of the enigmatic *Lecidella* species which infects *Pyrrhospora quernea*.

Fig. 14. The Old Man of Moccas (SO34211.43068, tag 00151) perhaps the oldest tree on the site but surprisingly poor for lichens. Moccas Park has suffered from historic acidic, sulphur dioxide pollution and this has taken its toll, with some trees such as this one particularly impoverished.

Fig. 15. *Lecanographa lyncea* growing on trunk of massive oak at SO34029.42809. Apothecia are not seen in this image (some poorly developed lirellae were present elsewhere on the tree). Note the presence of black, speckled colonies of the lichenicolous hyphomycete *Milospium graphideorum*, and the presence of numerous brown spots (apothecial initials). The latter were, until recently, considered to be a distinctive character of *L. amylacea* and this may have led to misidentifications.

Fig. 16. Massive oak at SO34029.42809 which was found to support perhaps the greatest diversity of notable lichens found on any tree at Moccas Park.

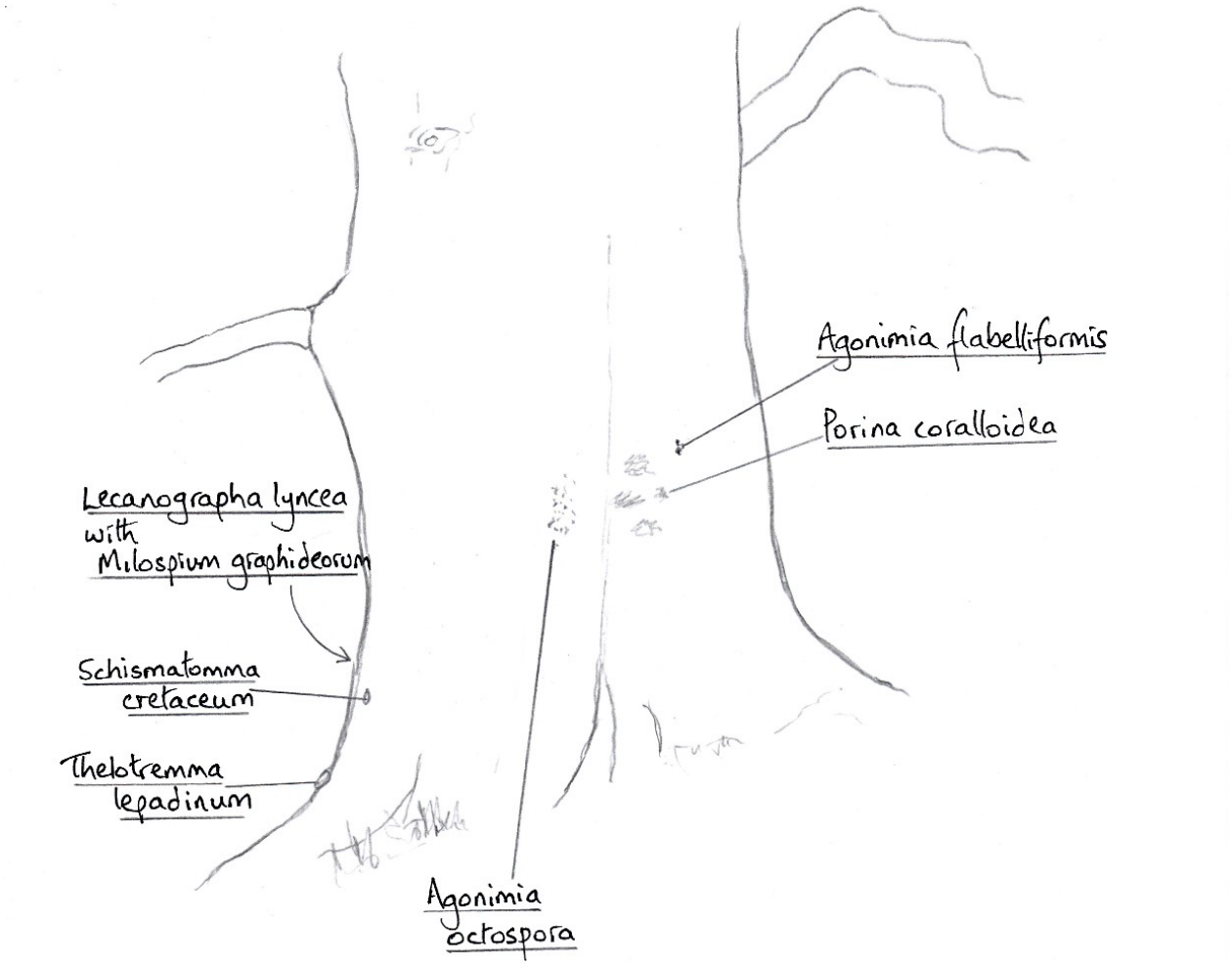


Fig. 17. Drawing of trunk shown in Fig. 16.

Fig. 18. *Aesculus hippocastani* (SO340.425) with a wound track caused by the scar of a missing branch. This wound track supports a large colony of *Bacidia incompta*.

Fig. 19. The exposed roots of the *Aesculus hippocastani* shown in Fig. 18. The roots produce little potholes which form temporary pools with overflows, reminiscent of those found on old *Fagus* trees. Specimens of a tiny cyanolichen turned out to be *Leptogium subtile* rather than its rarer look-alike *Collema fragrans*. Specimens of Porina collected from such exposed Aesculus roots were considered likely candidates for *P. byssophila* in the field but proved to be *P. borreri*.

Fig. 20. Old *Acer campestre* at SO33960.42532 (tag 07523) with a considerable colony of Bacidia incompta. The propped dead branch on the left side has *Gyalecta truncigena* and a specimen which has tentatively been identified as *Ramonia dictyospora* (to be confirmed).

Fig. 21. Rock outcrop supporting *Gyalecta ulmi* but on this particular outcrop present in limited quantity and appearing in poor condition due mainly to excessive shading by overhanging branches.

The survey - methods

The recent lichen survey was conducted by a group of lichenologists who spent two days in the field. All lichens and lichenicolous fungi that were encountered were recorded along with those non-lichenized fungi which are currently recorded by lichenologists (see for example the BLS Taxon Dictionary: http://www.britishlichensociety.org.uk/resources/lichen-taxon-database). The survey was conducted with the aid of x10 hand lenses and three spot chemicals. Handheld GPS provided accurate location of important lichens. Some of the species encountered cannot be reliably identified in the field, requiring microscopic examination. Very frugal specimens were pared off causing no damage to the trees and without causing any significant depletion to the population of the lichen species on the tree. Standard light microscope techniques were used for identification.

Taxa with IUCN threat categories (other than Least Concern) and those which are Nationally Rare/Nationally Scarce

Table 1 lists all taxa found at Moccas Park that have an IUCN designation other than Least Concern and those which are listed by Woods & Coppins (2012) as being Nationally Rare or Nationally Scarce. This analysis has the advantage of reference to the latest published (paper publication) Conservation Evaluation of British lichens and lichenicolous fungi but it does not fully distinguish the notable species present on the veterans from under-recorded 'weeds'. Codes for rarity of under-recorded species are given in lower case.

Table 1

Key to annotations on the table

Column A gives the standard BLS number for each taxon.

Column B gives the taxon name as currently listed in the BLS Taxon Dictionary.

Column C gives the group to which each taxon belongs (0 = lichenized fungus, {F} = non-lichenized fungus, {LF} = lichenicolous fungus).

Column D - Status:

Rarity: NR = Nationally Rare (occurring in 1–15 hectads in the UK); **NS** = Nationally Scarce (occurring in 16–100 hectads in the UK); **nr** and **ns** = species that are 'technically' Nationally Rare or Nationally Scarce, but which are thought to be much overlooked by recorders and hence much under-recorded.

Conservation evaluation: NE = Not evaluated owing to insufficient data; **LC** = Least Concern.

34	*Acrocordia gemmata*	0	LC L*
2588	*Agonimia flabelliformis*	0	NE NR
37	*Agonimia octospora*	0	NT NS Sc L IR
2683	*Arthonia parietinaria*	{LF}	NE ns
153	*Bacidia incompta*	0	VU A P Eng Sc Wa
2286	*Buellia hyperbolica*	0	VU D1 NR P Eng Wa
1642	*Caloplaca lucifuga*	0	VU C, D1 NR P Eng Sc Wa
2317	*Caloplaca phlogina*	0	NE ?NS
316	*Catillaria nigroclavata*	0	LC ns
1831	*Chaenothecopsis nigra*	0	LC NS
605	*Cresponea premnea*	0	LC Sc IR
2695	*Dimerella tavaresiana*	0	NE NR
542	*Gyalecta ulmi*	0	EN C2 NR P Eng Sc S8 IR
1704	*Halecania viridescens*	0	LC ns
2240	*Heterocephalacria physciacearum*	{LF}	LC ns
2071	*Illosporiopsis christiansenii*	{LF}	LC ns
600	*Lecanographa lyncea*	0	LC Sc IR
685	*Lecanora argentata*	0	LC ns
621	*Lecanora hagenii*	0	NE
673	*Lecanora quercicola*	0	VU D1 NS P Eng Sc Wa IR
779	*Lecanora sublivescens*	0	NT NS P Eng Wa IR
1710	*Lecidea nylanderi*	0	LC NS
1717	*Leptogium subtile*	0	LC NS
848	*Leptogium teretiusculum*	0	LC L*
892	*Milospium graphideorum*	{LF}	LC NS
949	*Ochrolechia arborea*	0	NT NR
2441	*Opegrapha viridipruinosa*	0	LC ns
1042	*Peltigera horizontalis*	0	LC L*
1068	*Pertusaria coronata*	0	LC NS
1170	*Porina borreri*	0	LC NS

1172	*Porina coralloidea*	0	LC NS Sc L IR
1793	*Protoparmelia oleagina*	0	LC NS
1297	*Rinodina roboris var. roboris*	0	LC Sc IR
1261	*Sphinctrina turbinata*	{LF}	LC NS
1318	*Sporodophoron cretaceum*	0	LC Sc IR
2260	*Unguiculariopsis thallophila*	{LF}	LC NS
1075	*Varicellaria hemisphaerica*	0	LC L*

New to VC 36 (Herefordshire)

Table 1: list of lichens and lichenicolous fungi recorded at Moccas Park
Column A gives the standard BLS number for each taxon.
Column B gives the name of each taxon recorded.
Column C indicates whether the taxon is a fungus recorded by lichenologists {F}, a lichenicolous fungus {LF} or a lichen (0).
Column D gives the conservation designations as follows: LC = Least Concern, NE = Not Evaluated, NS = Nationally Scarce, NR = Nationally Rare, VU = Vulnerable

10	*Acarospora fuscata*	0	LC
34	*Acrocordia gemmata*	0	LC L*
2588	*Agonimia flabelliformis*	0	NE NR
37	*Agonimia octospora*	0	NT NS Sc L IR
212	*Amandinea punctata*	0	LC
2683	*Arthonia parietinaria*	{LF}	NE NS
69	*Arthonia radiata*	0	LC
1542	*Arthopyrenia punctiformis*	{F}	LC
153	*Bacidia incompta*	0	VU A P Eng Sc Wa
161	*Bacidia phacodes*	0	LC
164	*Bacidia rubella*	0	LC
207	*Buellia griseovirens*	0	LC
2286	*Buellia hyperbolica*	0	VU D1 NR P Eng Wa
225	*Calicium glaucellum*	0	LC
228	*Calicium salicinum*	0	LC
231	*Calicium viride*	0	LC
242	*Caloplaca cerinella*	0	LC
825	*Caloplaca chrysodeta*	0	LC
2315	*Caloplaca flavocitrina*	0	LC
1642	*Caloplaca lucifuga*	0	VU C, D1 NR P Eng Sc Wa
2317	*Caloplaca phlogina*	0	NE ?NS
283	*Caloplaca ulcerosa*	0	LC
291	*Candelariella aurella f. aurella*	0	LC
297	*Candelariella reflexa*	0	LC
298	*Candelariella vitellina f. vitellina*	0	LC
311	*Catillaria lenticularis*	0	LC
316	*Catillaria nigroclavata*	0	LC NS

344	*Chaenotheca ferruginea*	0	LC
349	*Chaenotheca trichialis*	0	LC
1831	*Chaenothecopsis nigra*	0	LC NS
354	*Chrysothrix candelaris*	0	LC
383	*Cladonia digitata*	0	LC
404	*Cladonia parasitica*	0	LC
751	*Clauzadea monticola*	0	LC
429	*Cliostomum griffithii*	0	LC
2034	*Clypeococcum hypocenomycis*	{LF}	LC
605	*Cresponea premnea*	0	LC Sc IR
1315	*Dendrographa decolorans*	0	LC
2695	*Dimerella tavaresiana*	0	NE NR
491	*Diploicia canescens*	0	LC
504	*Enterographa crassa*	0	LC
2108	*Erythricium aurantiacum*	{LF}	LC
511	*Evernia prunastri*	0	LC
987	*Flavoparmelia caperata*	0	LC
521	*Fuscidea lightfootii*	0	LC
532	*Graphis elegans*	0	LC
541	*Gyalecta truncigena*	0	LC
542	*Gyalecta ulmi*	0	EN C2 NR P Eng Sc S8 IR
1704	*Halecania viridescens*	0	LC NS
2240	*Heterocephalacria physciacearum*	{LF}	LC NS
1125	*Hyperphyscia adglutinata*	0	LC
578	*Hypocenomyce scalaris*	0	LC
582	*Hypogymnia physodes*	0	LC
583	*Hypogymnia tubulosa*	0	LC
2071	*Illosporiopsis christiansenii*	{LF}	LC NS
1033	*Imshaugia aleurites*	0	LC
613	*Lecania cyrtella*	0	LC
159	*Lecania naegelii*	0	LC
600	*Lecanographa lyncea*	0	LC Sc IR
685	*Lecanora argentata*	0	LC NS
636	*Lecanora carpinea*	0	LC
639	*Lecanora chlarotera*	0	LC
643	*Lecanora conizaeoides f. conizaeoides*	0	LC
649	*Lecanora expallens*	0	LC
621	*Lecanora hagenii*	0	NE
667	*Lecanora polytropa*	0	LC
672	*Lecanora pulicaris*	0	LC
779	*Lecanora sublivescens*	0	NT NS P Eng Wa IR
783	*Lecanora sulphurea*	0	LC
2474	*Lecidea grisella*	0	LC
1710	*Lecidea nylanderi*	0	LC NS
797	*Lecidella elaeochroma f. elaeochroma*	0	LC

802	*Lecidella scabra*	0	LC
1974	*Lepraria incana s. str.*	0	LC
1604	*Lepraria vouauxii*	0	LC
1717	*Leptogium subtile*	0	LC NS
848	*Leptogium teretiusculum*	0	LC L*
997	*Melanelixia glabratula*	0	LC
1020	*Melanelixia subaurifera*	0	LC
993	*Melanohalea elegantula*	0	LC
877	*Micarea denigrata*	0	LC
892	*Milospium graphideorum*	{LF}	LC NS
921	*Ochrolechia androgyna*	0	LC
949	*Ochrolechia arborea*	0	NT NR
1781	*Ochrolechia microstictoides*	0	LC
926	*Ochrolechia parella*	0	LC
965	*Opegrapha vermicellifera*	0	LC
2441	*Opegrapha viridipruinosa*	0	LC NS
943	*Opegrapha vulgata*	0	LC
63	*Pachnolepia pruinata*	0	LC
1015	*Parmelia saxatilis s. lat.*	0	LC
1022	*Parmelia sulcata*	0	LC
1042	*Peltigera horizontalis*	0	LC L*
1056	*Pertusaria albescens var. albescens*	0	LC
1058	*Pertusaria amara f. amara*	0	LC
1064	*Pertusaria coccodes*	0	LC
1068	*Pertusaria coronata*	0	LC NS
1073	*Pertusaria flavida*	0	LC
1076	*Pertusaria hymenea*	0	LC
1087	*Pertusaria pertusa*	0	LC
1107	*Phaeophyscia orbicularis*	0	LC
1110	*Phlyctis argena*	0	LC
1112	*Physcia adscendens*	0	LC
1113	*Physcia aipolia*	0	LC
1119	*Physcia stellaris*	0	LC
1120	*Physcia tenella*	0	LC
1122	*Physcia tribacia*	0	LC
1126	*Physconia enteroxantha*	0	LC
1373	*Piccolia ochrophora*	0	LC
732	*Placynthiella icmalea*	0	LC
1168	*Porina aenea*	0	LC
1170	*Porina borreri*	0	LC NS
1172	*Porina coralloidea*	0	LC NS Sc L IR
1793	*Protoparmelia oleagina*	0	LC NS
2363	*Pseudevernia furfuracea var. furfuracea*	0	LC
1989	*Punctelia jeckeri*	0	LC
2070	*Punctelia subrudecta s. str.*	0	LC
1228	*Pyrrhospora quernea*	0	LC

1234	*Ramalina farinacea*	0	LC
1235	*Ramalina fastigiata*	0	LC
1266	*Rhizocarpon reductum*	0	LC
1297	*Rinodina roboris var. roboris*	0	LC Sc IR
1298	*Rinodina sophodes*	0	LC
1306	*Sarcogyne regularis*	0	LC
1261	*Sphinctrina turbinata*	{LF}	LC NS
1318	*Sporodophoron cretaceum*	0	LC Sc IR
692	*Trapeliopsis flexuosa*	0	LC
2260	*Unguiculariopsis thallophila*	{LF}	LC NS
1075	*Varicellaria hemisphaerica*	0	LC L*
908	*Violella fucata*	0	LC
2261	*Vouauxiella lichenicola*	{LF}	LC
1530	*Xanthoria parietina*	0	LC
1531	*Xanthoria polycarpa*	0	LC
2272	*Xanthoriicola physciae*	{LF}	LC

References

British Lichen Society Taxon Dictionary:
http://www.britishlichensociety.org.uk/resources/lichen-taxon-database

Coppins, A.M. & Coppins, B.J. (2002) *Indices of Ecological Continuity for Woodland Epiphytic Lichen Habitats in the British Isles*. British Lichen Society.

Hodgetts, N.G. (1992) *Guidelines for the selection of biological SSSIs: non-vascular plants.* Peterborough: Joint Nature Conservation Committee: http://jncc.defra.gov.uk/pdf/SSSIs_Chapter12.pdf

Natural England, list of S41 species:
http://publications.naturalengland.org.uk/publication/4958719460769

Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.J. & Wolseley, P.A., (eds) (2009) *The Lichens of Great Britain and Ireland*. London: British Lichen Society.

The Fungi of Great Britain and Ireland website: http://fungi.myspecies

Woods, R.G. & Coppins, B.J. (2012). A Conservation Evaluation of British Lichens and Lichenicolous Fungi. Species Status 13. Joint Nature Conservation Committee, Peterborough.