

Ardnagashel Estate and Arboretum, Bantry Bay, Co Cork.

An Initial Audit of the Lichen Flora and other Elements of Biodiversity

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DRAFT

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Introduction

This report is a contribution to an inventory of the cryptogamic biodiversity of Ardnagashel Arboretum, an interesting and significant site for cultural heritage and botany on the north shore of inner Bantry Bay. The report has been made to record the current situation and to provide information to those visiting the arboretum and interested in the cryptogams present. It is hoped that it will also help in the conservation of the botanical resources of the site. Ardnagashel Estate and Arboretum has potential to be used for educational and tourism purposes by botanists and the Ellen Hutchins Festival into the future.

The planting at Ardnagashel was undertaken in the 19th century by the Hutchins family, and from 1945 to the 1970s by the Kaulbacks. Both families had strong botanical links.

Ellen Hutchins (1785-1815), sister of Arthur Hutchins, first owner of Ardnagashel, was a botanist of note, studying mainly cryptogams, and there are several species with the epithet *hutchinsiae* named in her honour. The Hutchins family began the development of an extensive and varied arboretum, including fir trees and probably others provided by Kew Gardens, through Ellen's botanical connections. Among significant purchases of newly introduced plants from the commercial nursery, Veitch, were Chilean Myrtle (*Luma apiculata*). These orange-barked trees now form a very striking woodland at Ardnagashel East.

Ronald Kaulback had been an adventurer and plant collector in Tibet and Upper Burma before buying Ardnagashel in 1945. He added significantly to the collection of fine trees and shrubs, including magnolias, rhododendrons and camellias. The arboretum still features a wide range of exotic tree species, including several champion trees (oldest or tallest in Ireland).

This report is the first preliminary examination of the cryptogamic diversity at Ardnagashel. Between 1809 and 1812, Ellen Hutchins produced a list of plants found in her neighbourhood, including cryptogams, giving a historical resonance to this study. During the current audit, 108 species of lichen were recorded along with 63 species of fungi, 29 bryophytes (mosses and liverworts) and 15 algae (marine and terrestrial). Previously documented information on species present at the site, e.g. a list of trees present in the arboretum, was supplemented by additional recording during this survey. In total, 328 plants and other botanical species are listed in this report (see Figure 1 and Appendix 1).

Working within the two authors' skills with mycological taxonomy and their repertoire for plant and fungal recognition and identification, lichens, fungi and trees, are the best inventoried groups of biodiversity in this audit. Specialists in the botany of horticultural, bryological, pteridological and dendrological taxonomic groups are invited to augment these Ardnagashel site listings with their original observations. Biodiversity figures from each taxonomic group are given in Table 1.

Overall, this shows that Ardnagashel is highly biodiverse for plants and fungi.

Table 1: Biodiversity data for Ardnagashel (V9753)

Group	Species
Alga	2
Fern	9
Fungus	63
Hepatic	8
Lichen	108
Moss	21
Plant	41
Seaweed	13
Slime mold	2
Tree	60
Tree fern	1
Species noted	328

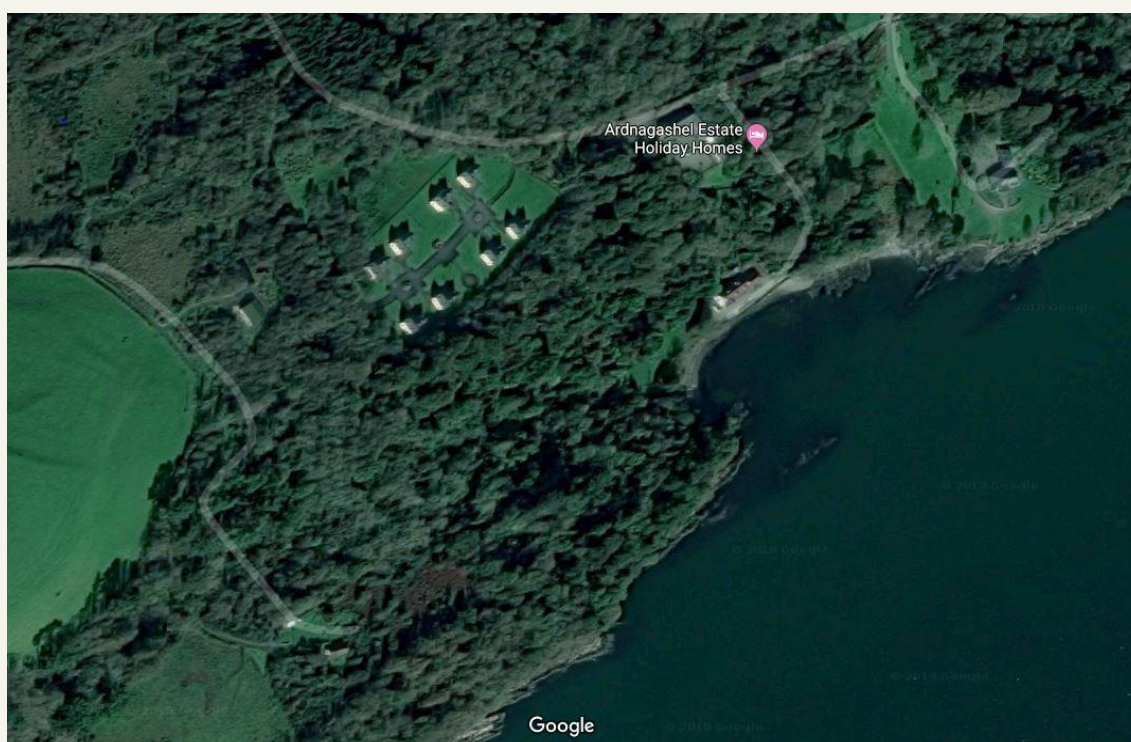


Figure 1: Ardnagashel from a recent satellite image

Location and habitats

Ardnagashel is a coastal townland in south-west Ireland. It is situated on the north shore of Bantry Bay, north-west of the town of Bantry and between the villages of Ballylickey and Glengarriff. It rises gently from the shore to a height of around 50m above sea level. There is a small south-east facing pebble beach on the site where Ardnagashel House once stood. A relatively straight, north-east/south-west orientated, rocky coastal outcrop of Old Red Sandstone lies to the west of the site. The site is largely wooded, with a mixture of exotic specimen trees and native trees and shrubs, which form excellent hosts for lichens, bryophytes and other epiphytes.

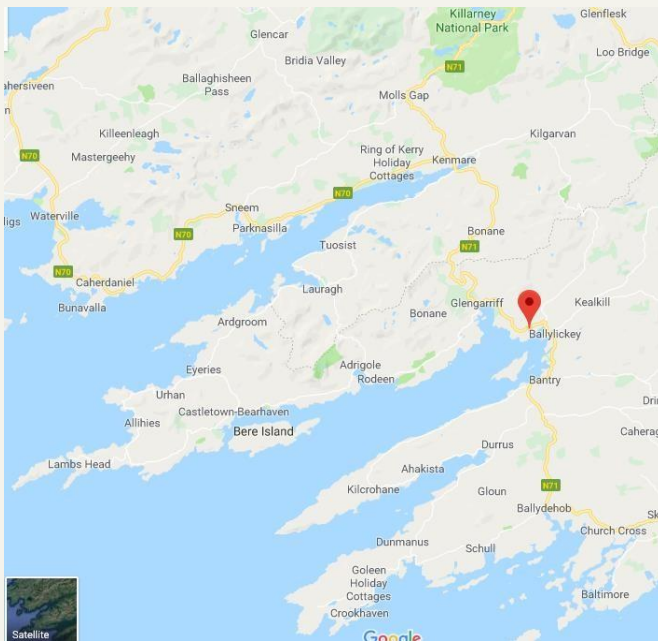


Figure 2a: The location of Ardnagashel in West Cork, south-west Ireland.

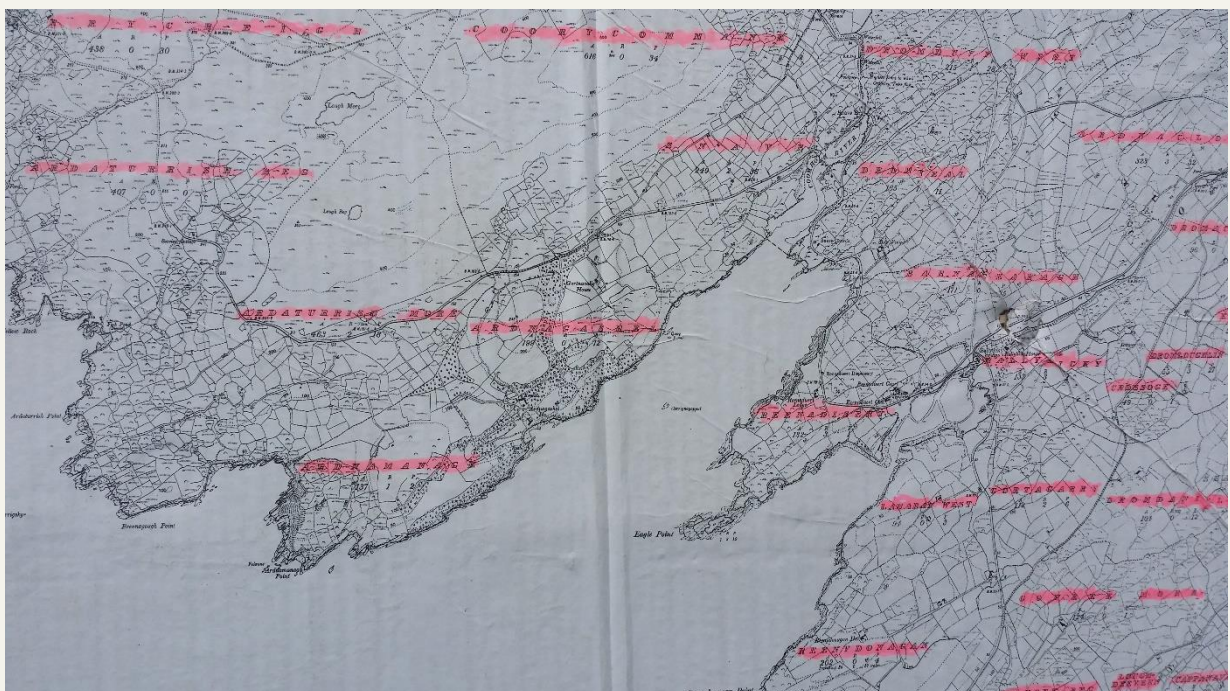
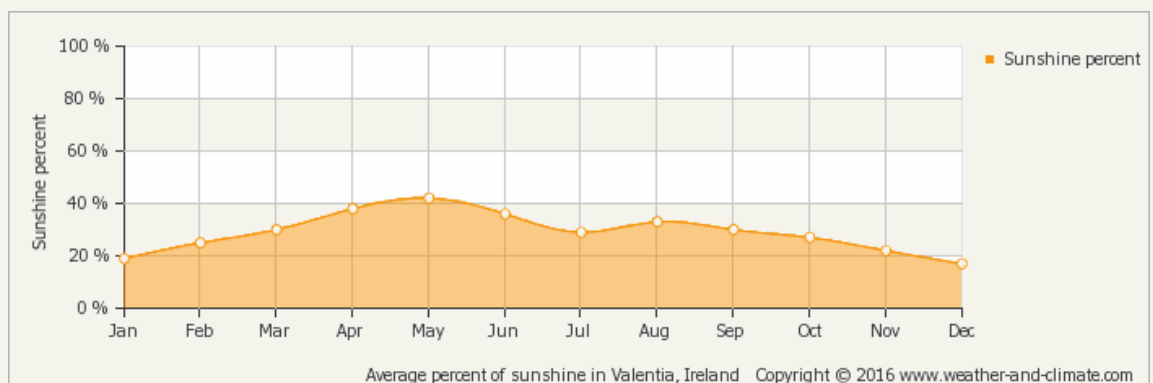
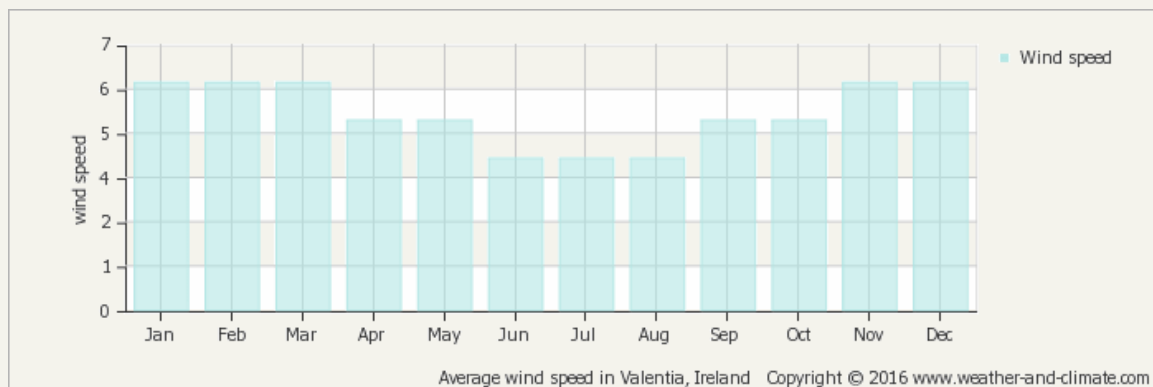
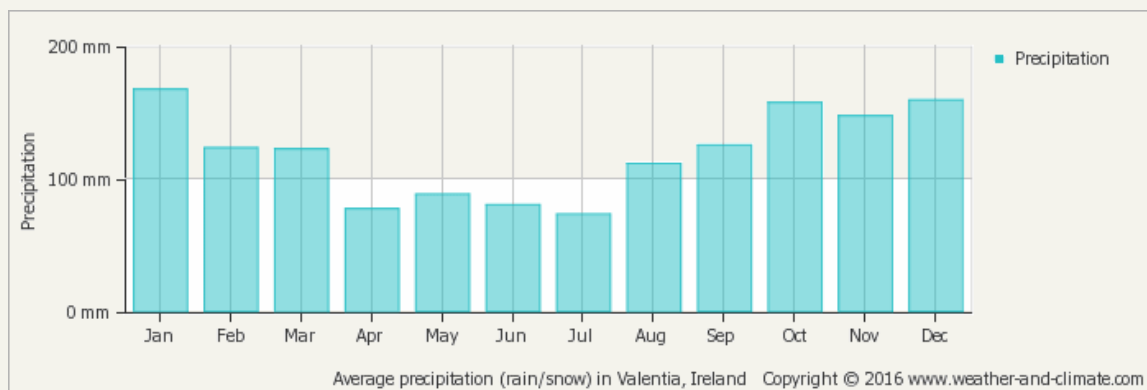
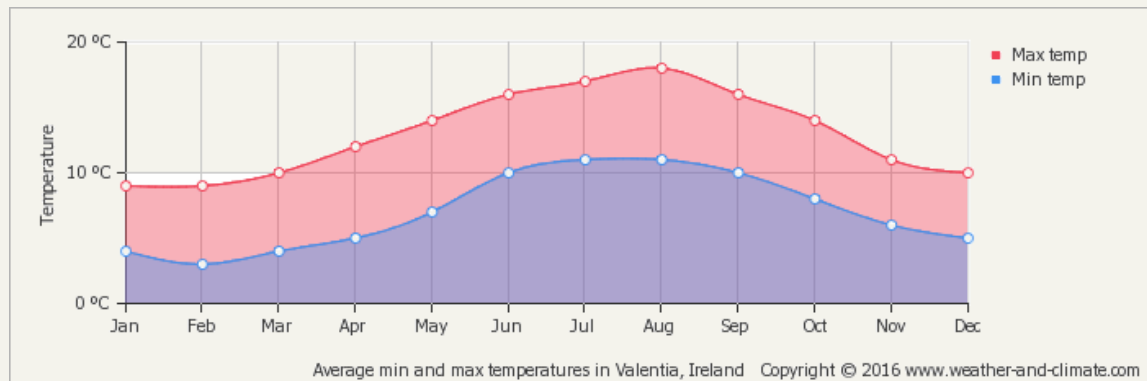


Figure 2b: 6" OS map showing the location of Ardnagashel townland

Climate

The site experiences nearly two metres of rainfall per annum and a temperate, oceanic climate. Despite it being on the coast, Ardnagashel is quite sheltered and the trees have grown very well, without being significantly misshapen or stunted by wind.

The climate data in the figures below taken from the nearest Meteorological Station, to the north-west of Ardnagashel at Valentia Island which is quite similar in climatic range to Ardnagashel.



Figures 3-6: Average monthly temperatures, precipitation, wind and hours of sunshine at Valentia Island Meteorological Station (Source of data: <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,bantry-county-cork-ie,Ireland>)

Geology

Ardnagashel is underlain by Devonian Old Red Sandstone. This rock supergroup dominates the south-west of Ireland with a range of red, green and purple sandstones, siltstones, conglomerates and shale. The package of rocks represents the time where the plates of Avalonia, Baltica and Laurentia had collided to create the Caledonian Mountain Chain. The mountains of the Old Red Sandstone Continent were rapidly eroding and rivers from the mountains were pouring great amounts of sediment into rivers, lakes and the sea. At that stage, the region around Ardnagashel was lying just south of the Equator. A large Bantry sub-basin was extensive in area and depth over time. Sedimentary rocks in the area represent evidence for river channels and lakes built up during the late Devonian and early Carboniferous Period between 380 to 340 Million years ago. Some of the trees of the time looked quite like the modern tree ferns, such as *Dicksonia antarctica*, to be seen today within the arboretum!

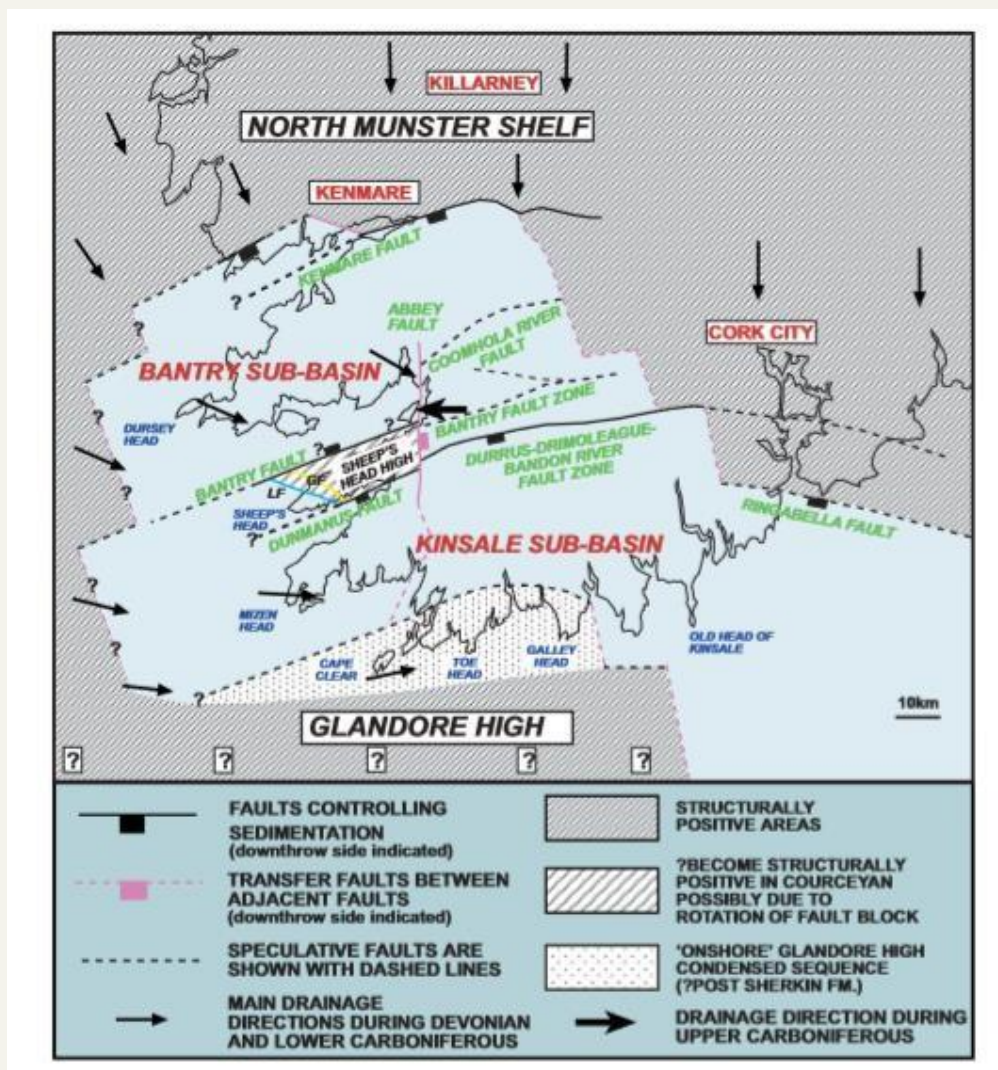


Figure 7: The geology of West Cork

Source: Ivor A. J. MacCarthy (2007) *The South Munster Basin of southwest Ireland*, *Journal of Maps*, 3:1, 149-172, DOI: 10.1080/jom.2007.9710835

Soils

The soil of Ardnagashel is largely brown podzolic, with morainic gravels being the main parent material. Other parts of the site have peat-derived soils.



Figure 8: Physiography of Ardnagashel
From the Geological Survey of Ireland Physiographic Map 2018

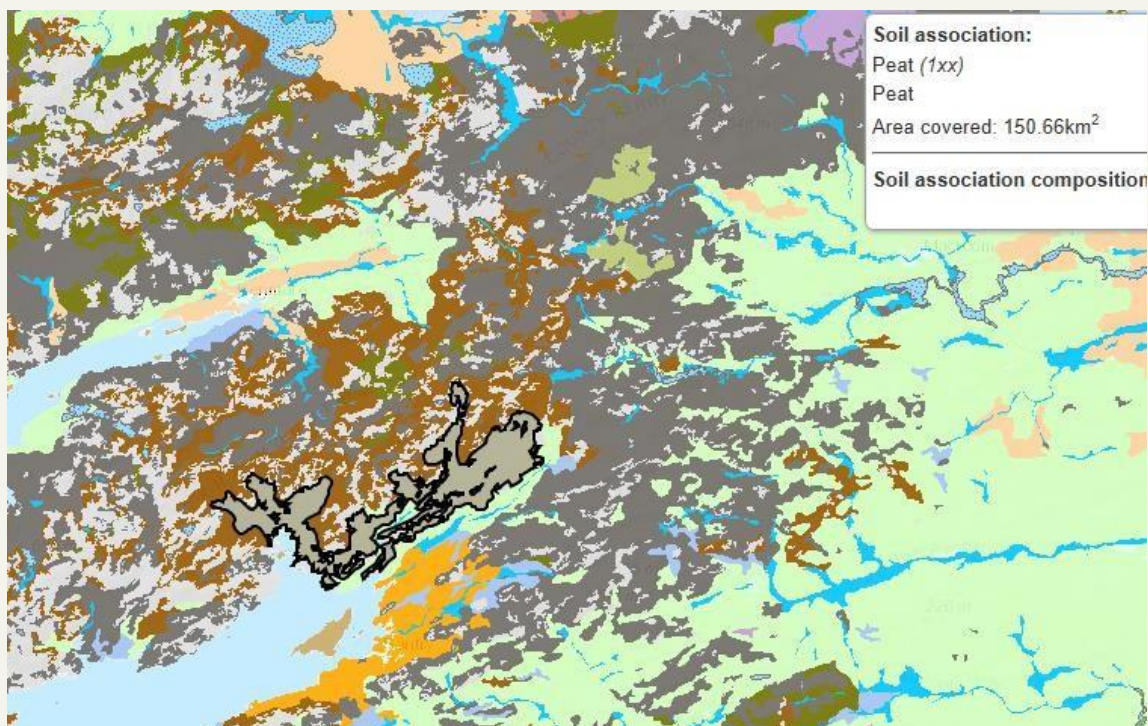


Figure 9: Soil map of the Bantry area (Source: <http://gis.teagasc.ie/soils/map.php>)

More detail on the local Bantry soil class can be found on
http://gis.teagasc.ie/soils/rep_profile_sheet.php?series_code=0410BA

A brief social history of Ardnagashel Arboretum with its botanical connections

Prior to 1800, Ardnagashel townland had two fishermen's cottages by the strand. Arthur Hutchins, who had been born and brought up in Ballylickey House nearby, bought Ardnagashel in 1800 and built a house there for himself, his wife Matilda and their children. Arthur's younger sister, Ellen Hutchins (1785-1815), was a notable botanist, and in contact with many leading botanists of her day. She spent the last months of her short life being nursed by Matilda at Ardnagashel and died there in February 1815, just before her thirtieth birthday.

Matilda had the responsibility of boxing up Ellen's plant specimens and drawings of seaweeds and sending these to Ellen's greatest botanist friend and mentor, Dawson Turner in Yarmouth, England. In a letter to him about this, Matilda apologised that her family had not been able to host Turner's daughter Maria and her husband, William Jackson Hooker, on their honeymoon in the spring of 1815. William Jackson Hooker was a highly respected botanist, making a major study of liverworts, and to whom Ellen sent a great number of specimens via Dawson Turner.

A significant Irish botanist who also had connections with the Hutchins family and Ardnagashel, was Thomas Taylor, a third cousin of Ellen and her brothers. His grandmother lived at Inchiclough, between Ardnagashel and Bantry, and his family home was near Kenmare. A Thomas Taylor specimen dated 1834, and noted as found at Ardnagashel, turned up recently in the Irish Herbarium Material at Harvard University.

After Arthur Hutchins' death in 1838, his youngest brother Samuel inherited Ardnagashel, and it was owned and lived in by three further generations of the Hutchins family up until 1945. It is thought that Arthur started the planting of the arboretum and it is known that Samuel planted trees there. Records show that the Hutchins family maintained contact with at least one of Ellen's botanist friends, William Jackson Hooker, who was knighted for his services to botany and became the first Director of the Botanic Gardens Kew. One letter tells us that Samuel took lodgings near Kew for six weeks, and he was in and out of the garden every day with Sir William. We know that Samuel planted a wonderful collection of fir trees in the arboretum at Ardnagashel in the 1840s or 1850s that had been supplied by Kew.

The specimen trees and rare material given to the Hutchins family from Kew collections may have been because of the need for climatic range to grow plant material sent as seeds or seedlings to Kew from around the world. Kew and other Botanical Gardens have always developed a network of host gardens with contrasting soils and climatic ranges to their own.

A striking element of the local flora is the Chilean Myrtle (*Luma apiculata*), with its orange, peeling bark, little shiny green leaves and small white flowers that blow and collect on the ground throughout the site from July to October. This species had been brought to Europe from Chile in 1844 by William Lobb, plant collector for Veitch Nurseries, and we know that Samuel Hutchins bought rare plants from Veitch. The myrtle has grown and regenerated extremely well at Ardnagashel, becoming invasive.



One of Samuel's sons, Samuel Newburgh Hutchins spent some time in Australia in his youth, as a mounted policeman, guarding and escorting gold during the gold rush. He returned home without gold but with 650 seeds of rare Australian plants for Ardnagashel! Almost all of the Ardnagashel Estate was sold in 1945 to Ronald Kaulback. He had accompanied Captain Kingdom-Ward, Himalayan explorer and botanist to Tibet and then ran his own expeditions to that region, collecting plants, snakes, frogs and insects for the Natural History Museum. He and his gardener, Donal Coakley, worked hard on reclaiming the Ardnagashel gardens and arboretum, and added significantly to the collection of trees and shrubs, including magnolias, camellias and rhododendrons. Ronald Kaulback and his wife Audrey ran the house as a hotel, until it burned down in 1968 due to an accident. The Kaulbacks left Ardnagashel in 1974.

Today Ardnagashel hosts a range of self-catering accommodation: in a modern bungalow built on the site of the old one; in cottages in the old stable yard; and houses on Horse Field. As a result of the Ellen Hutchins Festival (in Heritage Week), with its botany related events, there is renewed and deserved interest locally in Ardnagashel, its heritage and its wonderful botanical legacy.



Arboretum trees

The Ardnagashel Arboretum is home to a wide range of tree species. In 1981 a list of trees was made by John Bevan as part of his studentship at National Botanic Gardens, Glasnevin. Ardnagashel Arboretum is quite intact even though there has been neglect and there has been some attrition over the years. Some recent work has been carried out at the site to create walk-ways and small bridges and temporary features. It was not possible to re-identify all of Bevan's trees. Over the years since John Bevan's work, many trees have fallen while extensive natural regeneration continues to alter access within the site and appearances.



Figure 10: A map created by John Bevan as part of his study in 1981.

John Bevan's report and the full list of tree species that he identified is available here:

<http://www.ornaverum.org/reference/pdf/110.pdf>

Specialities of the Arboretum:

This is a significant arboretum, with a collection of trees from all over the world, including Irish champions (see below), and a wide range of interesting and rare shrubs, including a great collection of mature rhododendrons from the Himalayan mountains. All protected by a shelter belt and with extensive mixed woodland nearby.

Eliane Zimmerman lived at Ardnagashel for several years in the early 2000s and researched much of the history of Ardnagashel Arboretum, writing about it on her blog and website:

<https://ardnagashel.wordpress.com/the-estate/>. Much of the information below is based on her summary of the main species of note found in the arboretum.

Champion trees

Ardnagashel Arboretum and its surrounds feature some very large specimen trees according to the Tree Register of Ireland (TROI) based on work conducted by Aubrey Fennell. Some of these have been lost to storm damage and old age in the intervening years.

- Three mature cork trees (*Quercus suber*), one of which was the Irish champion, until its collapse in spring 2011
- An exceptional Japanese cedar (*Cryptomeria japonica*) with ten outstations
- The tallest *Podocarpus salignus* in Ireland and Britain (died autumn 2010)
- The biggest White Fir (*Abies alba*) – now in terribly bad condition, having lost most of its main branches.

Rhododendrons and camellias

- Rhododendrons: some exceptionally tall *Rhododendron sinogrande*, some of which was probably collected during a Himalayan expedition in the early 1930s.
- Camellias: among many unnamed camellias there is a rare *Camellia* 'Cornish Snow'.

Other special plants

- a rather tall Coast Redwood (*Sequoia sempervirens*)
- a unique and tall *Trochodendron aralioides*
- some rather tall tree ferns (*Dicksonia antarctica*)
- a rather tall Dove Tree (*Davidia involucrata*)
- two tall and multi-stemmed Gingerbread Trees (*Katsura japonica*)
- a rather tall and rare *Lomatia ferruginosa* (Fuinque, Palmilla)
- a very rare Colorado White Fir (*Abies concolor*)
- two very rare Tasmanian Dacrydioids (*D. cupressinum* and *Lagarostrobos* [D.] *franklinii*)
- a rare *Magnolia campbellii* ssp. *mollicomata* planted in the 1970s

Opinion on the habitat value at Ardnagashel

A good range of the main focal groups, i.e. lichens (108 species) and fungi (63 species), were recorded at the site, along with a range of bryophytes, algae, ferns and vascular plants. This survey means that Ardnagashel is now among the best documented of the old Anglo-Irish estates or arboreta in south-west Ireland in terms of cryptogamic botany. Many of the species found were what would be expected in the oceanic climate of West Cork, such as the bryophyte *Frullania microphylla* which has a western coastal distribution in Ireland and Britain (see Images 12 & 13). However, there were some finds of note including the nectriaceous fungus *Microcera coccophila* which is new to Ireland and Golden-hair Lichen (*Teloschistes flavicans*) (Image 4) an uncommon lichen with a distribution largely restricted to the southern coasts of Ireland and Britain. Other specimens collected require microscopy and so further finds of interest are likely to emerge.

Many epiphytic vegetation types of varying maturity in the site

The site is very complex from a biogeography perspective of spore plants and fungi. Different sections of this townland have been disturbed in different ways at different phases in the past two centuries. Over the last 50 years it has lost many unique garden plants due to normal attrition from plant old age, hard winters and the few summer droughts.

Microclimate and habitats

The mild oceanic temperate climate has an overarching microclimatic influence in the Arboretum making the whole area suitable for spore germination and life of species that like warm, humid and sheltered to more exposed microclimates on both bark of trees, evergreen leaves and rocks.

Foliicolous niches

The shrub *Lomatia ferruginea* has some hepatics on old leaves. Other evergreen shrubs and trees with old leaves, likewise support hepatics and even lichens on many attached persistent leaves.

Arboretum

The arboretum is a fascinating habitat for lichens. Some trees are covered in Lobaria lichens – while others would not support a Lobaria in a month of Sundays.

Rocky seashore

The area available of rocky shore is not that extensive as the shore shelves relatively steeply. The superficial quaternary sediment thickness is moderate, so the seashore mineral soil cliffs at the storm tide level are never more than a few metres high. The rocky seashore is an intact habitat, which is not degraded at this site.

Chilean Myrtle

As Chilean Myrtle (*Luma apiculata*), is forming a dense shady evergreen microphyll forest here, Ardnagashel is indeed an unusual and unique stand of woodland. From an epiphyte habitat perspective, as the bark sheds when it is still only a few years old, like Eucalyptus and other Myrtaceae, there is very limited area of old growth bark. Hence the epiphyte covering is limited to species that can colonise within a few years in the deep shade – *Metzgeria furcata*, *Stigula taylorii*, *Enterographa crassa*, and a few others from place to place. It is scientifically interesting in the fact of the limited diversity and visual distinctiveness of the orange bark of this forest type.



Image 1: Ardnagashel strand with Ardnagashel House and the view east.



Image 2: Intact rocky coastline with brown seaweed, white barnacle and black, yellow to grey lichen zonation.



Image 3: Ellen Hutchins Festival participants visiting Ardnagashel in 2016.



Image 4: Golden-hair Lichen *Teloschistes flavicans* on Silver Fir *Abies alba*



Images 5 & 6: A red-fruited *Cladonia* (left) and *Cladonia fimbriata* (r)



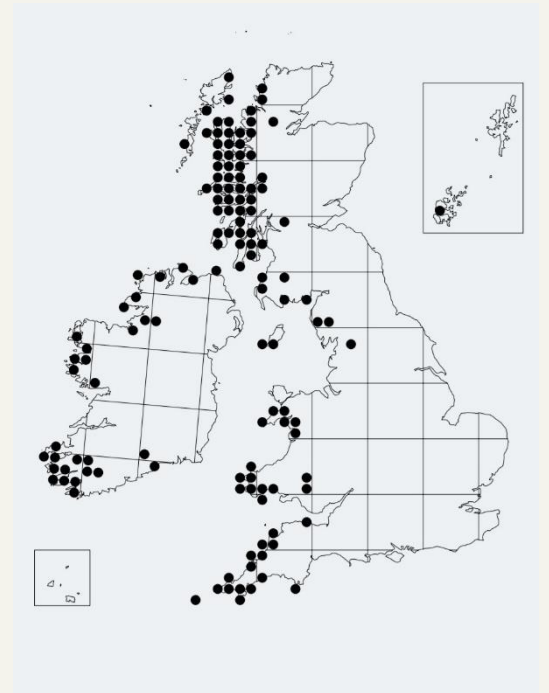
Image 7: Lichen *Lecanactis subabietina* on bark of Cork Oak (*Quercus suber*).



Image 8: *Ramelina calcicaris* shed from a tree



Images 9-11: Typical rocky shore lichens such as yellow *Xanthoria parietina* and white *Ochrolechia parella* (top photos) and *Ramelina cuspidata* (bottom photo) © Clare Heardman



Images 12 and 13: *Frullania microphylla* (liverwort) with *Pannaria rubiginosa* (lichen) seen on a single tree at Ardnagashel; distribution map of *F. microphylla* (Source: British Bryological Society).



Image 14: The edible mushroom *Coprinus comatus* in grass at Ardnagashel.

Appendix 1: Species list (alphabetical). Where appropriate, the host tree or other organism the species is associated with, is noted.

ARDNAGASHEL V9753			
BOTANICAL NAME	GROUP	ASSOCIATION	SOURCE
<i>Abies alba</i>	Tree		Bevan
<i>Abies grandis</i>	Tree		Bevan
<i>Acacia dealbata</i>	Tree		Bevan
<i>Acacia riceana</i>	Tree		Zimmerman
<i>Acer platanoides 'Schneidleri'</i>	Tree		Bevan
<i>Acer pseudoplatanus</i>	Tree		
<i>Achillea millefolium</i>	Plant		
<i>Aegopodium podagraria</i>	Plant		
<i>Aesculus hippocastanum</i>	Tree		Bevan
<i>Aesculus turbinata</i>	Tree		Bevan
<i>Agonimia octospora</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Agrostis canina</i>	Plant		
<i>Alnus glutinosa</i>	Tree		
<i>Amanita excelsa</i>	Fungus		131
<i>Amanita rubescens</i>	Fungus		
<i>Anagalis arvensis</i>	Plant		
<i>Anaptychia runcinata</i>	Lichen	ORS	
<i>Ardea cinerea</i>	Bird		
<i>Armillaria mellea</i>	Fungus		
<i>Arthonia atra</i>	Lichen		
<i>Arthonia cinnabarina</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Arthonia didyma</i>	Lichen	<i>Quercus petraea</i>	
<i>Arthonia ilicina</i>	Lichen	<i>Ilex aquifolium</i>	
<i>Arthopyrenia antecellens</i>	Lichen	<i>Quercus petraea</i>	
<i>Arthopyrenia punctiformis</i>	Lichen	<i>Betula pubescens</i>	
<i>Arum maculatum</i>	Plant		
<i>Ascodichaena rugosa</i>	Fungus	<i>Fagus sylvatica</i>	
<i>Asplenium adiantum-nigrum</i>	Fern		
<i>Asplenium scolopendrium</i>	Fern		
<i>Athyrium felix-femina</i>	Fern		
<i>Auricularia auricula-judae</i>	Fungus	<i>Acer pseudoplatanus</i>	
<i>Bacidia arceutina</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Barbula convoluta</i>	Moss		
<i>Bellis perennis</i>	Plant		
<i>Betula pubescens</i>	Tree		
<i>Biatoropsis usnearum</i>	Fungus	<i>Usnea subfloridana</i>	
<i>Blechnum spicant</i>	Fern		
<i>Boletus chrysenteron</i>	Fungus		
<i>Boletus luridus</i>	Fungus		
<i>Brachythecium rutabulum</i>	Moss		
<i>Bryum argenteum</i>	Moss		
<i>Buxus sempervirens</i>	Tree		
<i>Calluna vulgaris</i>	Plant		
<i>Caloplaca cerina</i>	Lichen	<i>Viburnum tinus</i>	
<i>Caloplaca crenularia</i>	Lichen		
<i>Caloplaca ferruginea</i>	Lichen	<i>Fraxinus excelsior</i>	

<i>Caloplaca marina</i>	Lichen		Bevan Bevan
<i>Caloplaca thallincola</i>	Lichen		
<i>Castanea sativa</i>	Tree		
<i>Catillaria pulverea</i>	Lichen	<i>Salix cinerea</i>	
<i>Cedrus deodara</i>	Tree		
<i>Cedrus libani</i>	Tree		
<i>Centaurea nigra</i>	Plant		
<i>Cercidiphyllum japonicum</i>	Tree		
<i>Chalcoporus piperatus</i>	Fungus		
<i>Chondrus crispus</i>	Seaweed		
<i>Chrysothrix candelaris</i>	Lichen	<i>Coniferae</i>	125 123
<i>Chrysothrix candelaris</i>	Lichen	<i>Coniferae</i>	
<i>Circaea lutetiana</i>	Plant		
<i>Cladonia coniocraea</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Cladonia macilenta</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Cladonia ramulosa</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Claviceps purpurea</i>	Fungus		
<i>Climacium dendroides</i>	Moss		
<i>Clitocybe nebularis</i>	Fungus		
<i>Clitopilus prunulus</i>	Fungus		
<i>Collybia butyracea</i>	Fungus		Bevan
<i>Collybia confluens</i>	Fungus		
<i>Coprinus comatus</i>	Fungus		
<i>Corallina officinalis</i>	Seaweed		
<i>Corda filum</i>	Seaweed		
<i>Cordyline australis</i>	monocot		
<i>Corylus avellana</i>	Tree		
<i>Cotoneaster simonsii</i>	Tree		
<i>Crataegus monogyna</i>	Tree		
<i>Crocasmia x crocosmifolia</i>	Plant		
<i>Cryptomeria japonica</i>	Tree		Bevan Bevan Bevan
<i>Cryptomeria japonica 'Elegans'</i>	Tree		
<i>Cupressus arizonica</i>	Tree		
<i>Cupressus macrocarpa</i>	Tree		
<i>Cyathus olla</i>	Fungus		
<i>Davidia involucrata</i>	Tree		
<i>Degelia atlantica</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Degelia atlantica</i>	Lichen	<i>Salix cinerea</i>	
<i>Degelia ligulata</i>	Lichen	ORS	
<i>Dermatocarpon miniatum</i>	Lichen	ORS	
<i>Desmococcus olivaceus</i>	Alga		Bevan
<i>Dicksonia antarctica</i>	Tree fern		
<i>Dimerella lutea</i>	Lichen	<i>Ulex europaeus</i>	
<i>Drimys winteri</i>	Tree		
<i>Dryopteris aemula</i>	Fern		
<i>Dryopteris dilitata</i>	Fern		
<i>Enterographa crassa</i>	Lichen	<i>Luma apiculata</i>	
<i>Enterographa crassa</i>	Lichen	<i>Quercus petraea</i>	
<i>Enteromorpha intestinalis</i>	Seaweed		
<i>Eucalyptus aggregata</i>	Tree		Zimmerman

<i>Eucalyptus bicostata</i>	Tree		Bevan
<i>Eucalyptus globulus</i>	Tree		Bevan
<i>Eurhynchium striatum</i>	Moss		
<i>Evernia prunastri</i>	Lichen	<i>Quercus petraea</i>	107
<i>Evernia prunastri</i>	Lichen	<i>Malus domestica</i>	117
<i>Evernia prunastri</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Evernia prunastri</i>	Lichen	<i>Malus domestica</i>	
<i>Exidia glandulosa</i>	Fungus		
<i>Exidia thuretiana</i>	Fungus	<i>Fraxinus excelsior</i>	
<i>Fagus sylvatica</i>	Tree		125
<i>Fellhanera bouteillei</i>	Lichen	<i>Lomatia ferruginea</i>	
<i>Flavoparmelia caperata</i>	Lichen	<i>Quercus petraea</i>	107
<i>Flavoparmelia caperata</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Flavoparmelia caperata</i>	Lichen	<i>Quercus petraea</i>	
<i>Fraxinus excelsior</i>	Tree		125
<i>Frullania dilitata</i>	Hepatic		
<i>Frullania tamarisci</i>	Hepatic		
<i>Fucus serratus</i>	Seaweed		
<i>Fucus vesiculosus</i>	Seaweed		
<i>Fuligo septica</i>	Slime mold		
<i>Funaria hygrometrica</i>	Moss		
<i>Fuscidea lightfootii</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Fuscidea lightfootii</i>	Lichen	<i>Salix cinerea</i>	
<i>Ganoderma applanatum</i>	Fungus	<i>Fagus sylvatica</i>	
<i>Geranium robertianum</i>	Plant		
<i>Graphina ruiziana</i>	Lichen	<i>Ilex aquifolium</i>	
<i>Graphis britannica</i>	Lichen		
<i>Graphis elegans</i>	Lichen	<i>Quercus petraea</i>	107
<i>Graphis scripta</i>	Lichen	<i>Corylus avellana</i>	
<i>Graphis scripta</i>	Lichen	<i>Viburnum tinus</i>	
<i>Grisellinia littoralis</i>	Tree		Photo
<i>Gunnera tinctoria</i>	Plant		
<i>Hebeloma crustuliniforme</i>	Fungus		
<i>Hedera helix</i>	Plant		125
<i>Herteliana taylorii</i>	Lichen	ORS	
<i>Himanthalia elongata</i>	Seaweed		
<i>Homalothecium sericeum</i>	Moss		
<i>Hookeria lucens</i>	Moss		115
<i>Hymenochaete corrugatum</i>	Fungus	<i>Corylus avellana</i>	
<i>Hypericum androsaceum</i>	Plant		
<i>Hyperphyscia adglutinata</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Hyphodontia sambuci</i>	Fungus	<i>Sambucus nigra</i>	
<i>Hypholoma fasciculare</i>	Fungus		
<i>Hypnum andoi</i>	Moss		
<i>Hypnum cupressiforme</i> v. <i>resupinatum</i>	Moss		122
<i>Hypotrachyna endochlora</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Hypotrachyna laevigata</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Hypotrachyna revoluta</i>	Lichen	<i>Lomatia ferruginea</i>	
<i>Hypoxylon fuscum</i>	Fungus	<i>Corylus avellana</i>	

<i>Hypoxylon numularia</i>	Fungus		Photo
<i>Ilex aquifolium</i>	Tree		
<i>Isothecium myosuroides</i>	Moss		
<i>Isothecium myurum</i>	Moss		
<i>Japewia carrollii</i>	Lichen	<i>Fraxinus excelsior</i>	Bevan
<i>Japewia carrollii</i>	Lichen	<i>Salix cinerea</i>	
<i>Jubula hutchinsiae</i>	Hepatic	<i>Salix cinerea</i>	
<i>Juglans regia</i>	Tree		
<i>Juncus effusus</i>	Plant		121
<i>Kindbergia praelonga</i>	Moss		
<i>Laccaria amethystina</i>	Fungus		
<i>Laccaria laccata</i>	Fungus	<i>Castanea sativa</i>	
<i>Laetiporus sulphureus</i>	Fungus	<i>Castanea sativa</i>	128
<i>Laminaria digitata</i>	Seaweed		
<i>Laminaria hyperborea</i>	Seaweed		
<i>Laminaria saccharina</i>	Seaweed		
<i>Lecanactis subabietina</i>	Lichen	<i>Coniferae</i>	104
<i>Lecanactis subabietina</i>	Lichen	<i>Eucalyptus</i>	
<i>Lecanactis subabietina</i>	Lichen	<i>Quercus petraea</i>	
<i>Lecania cyrtella</i>	Lichen	<i>Sambucus nigra</i>	
<i>Lecania cyrtella</i>	Lichen	<i>Viburnum tinus</i>	
<i>Lecanora albescens</i>	Lichen		
<i>Lecanora chlarotera</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Lecanora helicopsis</i>	Lichen		
<i>Lecidella elaeochroma</i>	Lichen	<i>Fraxinus excelsior</i>	125
<i>Lepraria incana</i>	Lichen	<i>Pteridium aquilinum</i>	
<i>Lepraria incana</i>	Lichen	<i>Coniferae</i>	
<i>Lepraria jackii</i>	Lichen	<i>Coniferae</i>	
<i>Leptoloma vouauxii</i>	Lichen	<i>Salix cinerea</i>	129
<i>Leptogium brebissonii</i>	Lichen	<i>Salix cinerea</i>	
<i>Leptogium burgessii</i>	Lichen	<i>Salix cinerea</i>	
<i>Leptogium cyanescens</i>	Lichen	<i>Salix cinerea</i>	
<i>Leptogium lichenoides</i>	Lichen	<i>Salix cinerea</i>	Photo
<i>Leptorhaphis epidermidis</i>	Lichen	<i>Betula pubescens</i>	
<i>Liriodendron tulipifera</i>	Tree		
<i>Lobaria pulmonaria</i>	Lichen	<i>Salix cinerea</i>	
<i>Lobaria pulmonaria</i>	Lichen	<i>Acer pseudoplatanus</i>	110
<i>Lobaria scrobiculata</i>	Lichen	<i>Salix cinerea</i>	
<i>Lobaria scrobiculata</i>	Lichen	<i>Quercus petraea</i>	106
<i>Lomatia ferruginea</i>	Tree		
<i>Lomatia ferruginosa</i>	Tree		Photo
<i>Lonicera periclymenum</i>	Plant		
<i>Luma apiculata</i>	Tree		Photo
<i>Luzula sylvatica</i>	Plant		
<i>Lycoperdon perlatum</i>	Fungus		Bevan
<i>Magnolia campbellii</i> var. <i>mollicomata</i>	Tree		
<i>Malus domestica</i>	Tree		Photo
<i>Melanelia exasperata</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Melanelia exasperata</i>	Lichen	<i>Salix cinerea</i>	

<i>Melanelia exasperata</i>	Lichen	<i>Viburnum tinus</i>	111
<i>Melanelia exasperatula</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Melanelia subaurifera</i>	Lichen	<i>Quercus petraea</i>	
<i>Melanelia subaurifera</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Mentha aquatica</i>	Plant		
<i>Metzgeria conjugata</i>	Hepatic		
<i>Metzgeria fruticulosa</i>	Hepatic		
<i>Metzgeria furcata</i>	Hepatic	<i>Salix atrocinerea</i>	
<i>Microcera coccophila</i>	Fungus	<i>Fraxinus excelsior</i>	
<i>Microlejeunea ulicina</i>	Hepatic		
<i>Mollisia cinerea</i>	Fungus	<i>Eucalyptus</i>	
<i>Mycena adscendens</i>	Fungus		
<i>Mycena capillaris</i>	Fungus		
<i>Mycena epiglyptera</i>	Fungus		
<i>Mycena pura</i>	Fungus		
<i>Mycoblastus sterilis</i>	Lichen	<i>Ilex aquifolium</i>	
<i>Myosotis arvensis</i>	Plant		
<i>Myrangium durarei</i>	Fungus	<i>Fraxinus excelsior</i>	
<i>Neckera complanata</i>	Moss		
<i>Nectria cinnabarina</i>	Fungus	<i>Acer pseudoplanatus</i>	
<i>Normandina pulchella</i>	Lichen	<i>Eucalyptus</i>	122
<i>Normandina pulchella</i>	Lichen	<i>Salix cinerea</i>	
<i>Normandina pulchella</i>	Lichen	<i>Viburnum tinus</i>	
<i>Ochrolechia androgyna</i>	Lichen	<i>Quercus petraea</i>	
<i>Ochrolechia parella</i>	Lichen		118
<i>Opegrapha atra</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Orthotrichum lyellii</i>	Moss		
<i>Osmunda regalis</i>	Fern		
<i>Oudemansiella mucida</i>	Fungus		107
<i>Pannaria rubiginosa</i>	Lichen	<i>Salix cinerea</i>	
<i>Parasola plicatilis</i>	Fungus		
<i>Parmelia sulcata</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Parmelia sulcata</i>	Lichen	<i>Malus domestica</i>	117
<i>Parmeliella parvula</i>	Lichen	<i>Salix cinerea</i>	
<i>Parmotrema perlatus</i>	Lichen	<i>Quercus petraea</i>	
<i>Parmotrema perlatus</i>	Lichen	<i>Malus domestica</i>	
<i>Parmotrema perlatus</i>	Lichen	<i>Castanea sativa</i>	128
<i>Parmotrema perlatus</i>	Lichen	<i>Lomatia ferruginea</i>	
<i>Parmotrema reticulatum</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pellia epiphylla</i>	Hepatic		
<i>Peltigera collina</i>	Lichen	<i>Malus domestica</i>	108
<i>Peltigera praetextata</i>	Lichen	ORS	
<i>Peltigera praetextata</i>	Lichen	<i>Salix cinerea</i>	
<i>Pelvetia canaliculata</i>	Seaweed		
<i>Peniophora lycii</i>	Fungus	<i>Eucalyptus</i>	108
<i>Pertusaria albescens</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria amara</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria hymenea</i>	Lichen	<i>Quercus petraea</i>	
<i>Pertusaria hymenea</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria leioplaca</i>	Lichen	<i>Corylus avellana</i>	

<i>Pertusaria leioplaca</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria multipuncta</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria pertusa</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pertusaria pseudocorallina</i>	Lichen	ORS	
<i>Phaeographis smithii</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Phaeophyscia orbicularis</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Phallus impudicus</i>	Fungus		
<i>Phlyctis argena</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Physcia aipolia</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Physcia aipolia</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Physcia aipolia</i>	Lichen	<i>Salix cinerea</i>	
<i>Physcia tenella</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Physcia tenella</i>	Lichen	<i>Lomatia ferruginea</i>	
<i>Physconia distorta</i>	Lichen	<i>Fagus sylvatica</i>	Bevan Bevan
<i>Picea omorika</i>	Tree		
<i>Pinus armandii</i>	Tree		
<i>Pinus sylvestris</i>	Tree		
<i>Piptoporus betulinus</i>	Fungus	<i>Betula pubescens</i>	
<i>Plantago lanceolata</i>	Plant		
<i>Plantago major</i>	Plant		Bevan 113
<i>Platanus acerifolia</i>	Tree		
<i>Pleurotus ostreatus</i>	Fungus	<i>Grisellinia littoralis</i>	
<i>Pluteus cervinus</i>	Fungus		Bevan
<i>Podocarpus salignus</i>	Tree		
<i>Polypodium vulgare</i>	Fern	<i>Quercus petraea</i>	
<i>Polysiphonia lanosa</i>	Seaweed		
<i>Potentilla anserina</i>	Plant		
<i>Porpidia tuberculosa</i>	Lichen	ORS	
<i>Prunopitys andina</i>	Tree		125
<i>Prunus laurocerasus</i>	Tree		
<i>Psathyrella candolleana</i>	Fungus		
<i>Pteridium aquilifolium</i>	Fern		
<i>Punctelia subrudecta</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Pycnostysanus azaleae</i>	Fungus	<i>Rhododendron</i>	
<i>Pyrenula macrospora</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Pyrenula occidentalis</i>	Lichen	<i>Fraxinus excelsior</i>	
<i>Pyrrhospora quernea</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Quercus petraea</i>	Tree		
<i>Quercus suber</i>	Tree		
<i>Ramalina calicaris</i>	Lichen	<i>Malus domestica</i>	
<i>Ramalina cuspidata</i>	Lichen	ORS	
<i>Ramalina farinacea</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Ramalina fraxinea</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Ramalina siliquosa</i>	Lichen	ORS	
<i>Ranunculus acris</i>	Plant		
<i>Ranunculus repens</i>	Plant		
<i>Reynoutria japonica</i>	Plant		
<i>Rhizocarpon richardii</i>	Lichen	ORS	
<i>Rhododendron ponticum</i>	Tree		
<i>Rhopoglyphus filicinus</i>	Fungus	<i>Pteridium aquilinum</i>	125

<i>Rhytidiadelphus loreus</i>	Moss		122
<i>Rhytidiadelphus squarrosus</i>	Moss		
<i>Rhytidiadelphus triquetrus</i>	Moss		
<i>Rhytisma acerinum</i>	Fungus	<i>Acer pseudoplanatus</i>	
<i>Robinia pseudoacacia</i>	Tree		Bevan
<i>Rubus fruticosus</i> agg.	Plant		
<i>Rubus idaeus</i>	Plant		
<i>Rubus spectabilis</i>	Plant		
<i>Rumex acetosella</i>	Plant		
<i>Russula cyanoxantha</i>	Fungus		130
<i>Russula emetica</i>	Fungus	<i>Castanea sativa</i>	128
<i>Salix cinerea</i>	Tree		
<i>Sambucus nigra</i>	Tree		
<i>Saponaria officinalis</i>	Plant		
<i>Saxifraga spathularis</i>	Plant		
<i>Schizophyllum commune</i>	Fungus		120
<i>Seifertia azaleae</i>	Fungus	<i>Rhododendron</i>	109
<i>Senecio aquatica</i>	Plant		
<i>Sequoia sempervirens</i>	Tree		Bevan
<i>Solidago virgaurea</i>	Plant		
<i>Sonchus arvensis</i>	Plant		
<i>Stemonitis fusca</i>	Slime mold	<i>Fagus sylvatica</i>	
<i>Stenocybe septata</i>	Fungus	<i>Ilex aquifolium</i>	
<i>Stereum gausapatum</i>	Fungus		119
<i>Sticta canariensis dufourii</i>	Lichen		
<i>Sticta fuliginosa</i>	Lichen	<i>Salix cinerea</i>	127
<i>Sticta limbata</i>	Lichen	<i>Salix cinerea</i>	
<i>Sticta sylvatica</i>	Lichen	<i>Salix cinerea</i>	112
<i>Stictis radiata</i>	Fungus	<i>Eucalyptus</i>	
<i>Stictis radiata</i>	Fungus	<i>Salix cinerea</i>	
<i>Stigmatidium microspilum</i>	Fungus	<i>Corylus avellana</i>	
<i>Strigula taylorii</i>	Lichen	<i>Luma apiculata</i>	
<i>Succisa pratensis</i>	Plant		
<i>Symphoricarpos albus</i>	Tree		
<i>Taraxacum officinalis</i>	Plant		
<i>Tasmannia lanceolata</i>	Tree		Zimmerman
<i>Taxus baccata</i>	Tree		
<i>Teloschistes flavicans</i>	Lichen	<i>Abies alba</i>	
<i>Teloschistes flavicans</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Thamnobryum alopecurum</i>	Moss		
<i>Thelotrema lepadinum</i>	Lichen	<i>Fagus sylvatica</i>	
<i>Thuidium tamariscinum</i>	Moss		
<i>Thujopsis dolabrata</i>	Tree		Bevan
<i>Tomasellia gelatinosa</i>	Fungus	<i>Quercus petraea</i>	
<i>Tremetes versicolor</i>	Fungus		
<i>Trentepohlia aurea</i>	Alga		
<i>Trochila ilicis</i>	Fungus	<i>Ilex aquifolium</i>	124
<i>Tubaria furfuracea</i>	Fungus		
<i>Ulex europaeus</i>	Tree		
<i>Ulmus glabra</i>	Tree		

<i>Ulmus procera</i>	Tree		Bevan
<i>Ulota crispa</i>	Moss		125
<i>Ulva lactuca</i>	Seaweed		
<i>Umbilicus rupestris</i>	Plant	ORS	Photo
<i>Usnea ceratina</i>	Lichen	<i>Malus domestica</i>	
<i>Usnea ceratina</i>	Lichen	<i>Quercus petraea</i>	
<i>Usnea cornuta</i>	Lichen	<i>Castanea sativa</i>	128
<i>Usnea cornuta</i>	Lichen	<i>Malus domestica</i>	
<i>Usnea fragiliscens</i>	Lichen	<i>Malus domestica</i>	117
<i>Usnea fragiliscens</i>	Lichen	<i>Malus domestica</i>	
<i>Usnea rubicunda</i>	Lichen	<i>Quercus petraea</i>	107
<i>Usnea subfloridana</i>	Lichen	<i>Malus domestica</i>	
<i>Usnea subfloridana</i>	Lichen	<i>Quercus petraea</i>	
<i>Veronica arvensis</i>	Plant		
<i>Verrucaria maura</i>	Lichen	ORS	
<i>Verrucaria mucosa</i>	Lichen	ORS	
<i>Vespa communis</i>	Insect		
<i>Vinca minor</i>	Plant		
<i>Viola riviniana</i>	Plant		
<i>Vouauxiella lichenicola</i>	Fungus	<i>Lecanora chlarotera</i>	
<i>Xanthoria parietina</i>	Lichen	<i>Malus domestica</i>	
<i>Xanthoria parietina</i>	Lichen	ORS	
<i>Xanthoria parietina</i>	Lichen	<i>Viburnum tinus</i>	
<i>Xerocomus chrysenteron</i>	Fungus	<i>Quercus petraea</i>	
<i>Xylaria hypoxylon</i>	Fungus	<i>Fraxinus excelsior</i>	

Appendix 2: Species listed by group

Lichens

<i>Agonimia octospora</i>	<i>Lecanactis subabietina</i>
<i>Anaptychia runcinata</i>	<i>Lecania cyrtella</i>
<i>Arthonia atra</i>	<i>Lecanora albescens</i>
<i>Arthonia cinnabarina</i>	<i>Lecanora chlarotera</i>
<i>Arthonia didyma</i>	<i>Lecanora helicopsis</i>
<i>Arthonia ilicina</i>	<i>Lecidella elaeochroma</i>
<i>Arthopyrenia antecellens</i>	<i>Lepraria incana</i>
<i>Arthopyrenia punctiformis</i>	<i>Lepraria jackii</i>
<i>Bacidia arceutina</i>	<i>Leptoloma vouauxii</i>
<i>Caloplaca cerina</i>	<i>Leptogium brebissonii</i>
<i>Caloplaca crenularia</i>	<i>Leptogium burgessii</i>
<i>Caloplaca ferruginea</i>	<i>Leptogium cyanescens</i>
<i>Caloplaca marina</i>	<i>Leptogium oides</i>
<i>Caloplaca thallincola</i>	<i>Leptorhaphis epidermidis</i>
<i>Catillaria pulvereae</i>	<i>Lobaria pulmonaria</i>
<i>Chrysothrix candelaris</i>	<i>Lobaria scrobiculata</i>
<i>Cladonia coniocraea</i>	<i>Melanelia exasperata</i>
<i>Cladonia macilenta</i>	<i>Melanelia exasperatula</i>
<i>Cladonia ramulosa</i>	<i>Melanelia subaurifera</i>
<i>Degelia atlantica</i>	<i>Mycoblastus sterilis</i>
<i>Degelia ligulata</i>	<i>Normandina pulchella</i>
<i>Dermatocarpon miniatum</i>	<i>Ochrolechia androgyna</i>
<i>Dimerella lutea</i>	<i>Ochrolechia parella</i>
<i>Enterographa crassa</i>	<i>Opegrapha atra</i>
<i>Evernia prunastri</i>	<i>Pannaria rubiginosa</i>
<i>Fellhanera bouteillei</i>	<i>Parmelia sulcata</i>
<i>Flavoparmelia caperata</i>	<i>Parmeliella parvula</i>
<i>Fuscidea lightfootii</i>	<i>Parmotrema perlatum</i>
<i>Graphina ruiziana</i>	<i>Parmotrema reticulatum</i>
<i>Graphis britannica</i>	<i>Peltigera collina</i>
<i>Graphis elegans</i>	<i>Peltigera praetextata</i>
<i>Graphis scripta</i>	<i>Pertusaria albescens</i>
<i>Herteliana taylorii</i>	<i>Pertusaria amara</i>
<i>Hyperphyscia adglutinata</i>	<i>Pertusaria hymenea</i>
<i>Hypotrachyna endochlora</i>	<i>Pertusaria leioplaca</i>
<i>Hypotrachyna laevigata</i>	<i>Pertusaria multipuncta</i>
<i>Hypotrachyna revoluta</i>	<i>Pertusaria pertusa</i>
<i>Japewia carrollii</i>	<i>Pertusaria pseudocorallina</i>

Lichens (continued)

Phaeographis smithii
Phaeophyscia orbicularis
Phlyctis argena
Physcia aipolia
Physcia tenella
Physconia distorta
Porpidia tuberculosa
Punctelia subrudecta
Pyrenula macrospora
Pyrenula occidentalis
Pyrrhospora quernea
Ramalina calicaris
Ramalina cuspidata
Ramalina farinacea
Ramalina fraxinea
Ramalina siliquosa
Rhizocarpon richardii
Sticta canariensis dufourii
Sticta fuliginosa
Sticta limbata
Sticta sylvatica *Strigula taylorii*
Teloschistes flavicans
Thelotrema lepadinum
Usnea ceratina
Usnea cornuta
Usnea fragilescens
Usnea rubicunda
Usnea subfloridana
Verrucaria maura
Verrucaria mucosa

Liverworts

Frullania dilitata
Frullania tamarisci
Jubula hutchinsiae
Metzgeria conjugata
Metzgeria fruticulosa
Metzgeria furcata
Microlejeunea ulicina
Pellia epiphylla

Mosses

Barbula convoluta
Brachythecium rutabulum
Bryum argenteum
Climacium dendroides
Eurhynchium striatum
Funaria hygrometrica
Homalothecium sericeum
Hookeria lucens
Hypnum cupressiforme var resupinum
Isothecium myosuroides
Isothecium myurum
Kindbergia praelonga
Neckera complanata
Orthotrichum lyellii
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetris
Thamnobryum alopecurum
Thuidium tamariscinum
Ulota crispa

Algae

Desmococcus olivaceus
Trentepohlia aurea

Slime molds

Fuligo septica
Stemonitis fusca

Seaweed

Chondrus crispus
Corallina officinalis
Corda filum
Enteromorpha intestinalis
Fucus serratus
Fucus vesiculosus
Himanthalia elongata
Laminaria digitata
Laminaria hyperborea
Laminaria saccharina
Pelvetia canaliculata
Polysiphonia lanosa
Ulva lactuca

Fungi

Amanita excelsa
Amanita reubescens
Armillaria mellea
Ascodichaena rugosa
Auricularia auricula-judae
Biatoropsis usnearum
Boletus chrysenteron
Boletus luridus
Chalcoporus piperatus
Claviceps purpurea
Clitocybe nebularis
Clitopilus prunulus
Collybia butyracea
Collybia confluens
Coprinus comatus
Cyathus olla
Exidia glandulosa
Exidia thuretiana
Ganoderma applanatum
Hebeloma crustuliniforme
Hymenochaete corrugatum
Hyphodontia sambuci
Hypholoma fasciculare
Hypoxylon fuscum
Hypoxylon numularia
Laccaria amethystina
Laccaria laccata
Laetiporus sulphureus
Lycoperdon perlatum
Microcera coccophila
Mollisia cinereal
Mycena adscendens
Mycena capillaris
Mycena epiglyptera
Mycena pura
Myrangium durarei
Nectria cinnabarina
Oudemansiella mucida
Parasola plicatilis
Peniophora lycii

Phallus impudicus
Piptoporus betulinus
Pleurotus ostreatus
Pluteus cervinus
Psathyrella candolleana
Pycnostysanus azaleae
Rhopographus filicinus
Rhytisma acerinum
Russula emetica
Russula cyanoxantha
Schizophyllum commune
Seifertia azaleae
Stenocybe septata
Stereum gausapatum
Stictis radiata
Stigmidium microspilum
Tomasellia gelatinosa
Tremetes versicolor
Trochila ilicis
Tubaria furfuracea
Vouauxiella icola
Xerocomus chrysenteron
Xylaria hypoxylon

Ferns

Asplenium adiantum-nigrum
Asplenium scolopendrium
Athyrium felix-femina
Blechnum spicant
Dryopteris aemula
Dryopteris dilitata
Osmunda regalis
Polypodium vulgare
Pteridium aquilinum

Tree fern

Dicksonia antarctica

Tree-monocot

Cordyline australis

Trees and shrubs

Abies alba
Abies grandis
Acacia dealbata
Acacia riceana
Acer platanoides 'Schneidleri'
Acer pseudoplatanus
Aesculus hippocastanum
Aesculus turbinata
Alnus glutinosa
Betula pubescens
Buxus sempervirens
Castanea sativa
Cedrus deodara
Cedrus libani
Cercidiphyllum japonicum
Corylus avellana
Cotoneaster simonsii
Crataegus monogyna
Cryptomeria japonica
Cryptomeria japonica 'Elegans'
Cupressus arizonica
Cupressus macrocarpa
Davidia involucrata
Drimys winteri
Eucalyptus aggregate
Eucalyptus bicostata
Eucalyptus globulus
Fagus sylvatica
Fraxinus excelsior
Griselinia littoralis
Ilex aquifolium
Juglans regia
Liriodendron tulipifera
Lomatia ferruginea
Lomatia ferruginosa
Luma apiculata
Magnolia campbellii var. *mollicomata*
Malus domestica
Picea omorika
Pinus armandii
Pinus sylvestris

Platanus acerifolia
Podocarpus salignus
Prunopitys andina
Prunus laurocerasus
Quercus petraea
Quercus suber
Rhododendron ponticum
Robinia pseudoacacia
Salix cinerea
Sambucus nigra
Sequoia sempervirens
Symphoricarpos albus
Tasmannia lanceolata
Taxus baccata
Thujopsis dolobrata
Ulex europaeus
Ulmus glabra
Ulmus procera

Plants

Achillea millefolium

Aegopodium podagraria

Agrostis canina

Anagalis arvensis

Potentilla anserina

Arum maculatum

Bellis perennis

Calluna vulgaris

Centaurea nigra

Circaea lutetiana

Crocosmia x crocosmifolia

Geranium robertianum

Gunnera tinctoria

Hedera helix

Hypericum androsaemum

Juncus effusus

Lonicera periclymenum

Luzula sylvatica

Mentha aquatica

Myosotis arvensis

Plantago major subsp. *intermedia*

Plantago lanceolata

Plantago major

Ranunculus acris

Ranunculus repens

Reynoutria japonica

Rubus fruticosus agg.

Rubus idaeus

Rubus spectabilis

Rumex acetosella

Saponaria officinalis

Saxifraga spathularis

Senecio aquatica

Solidago virgaurea

Sonchus arvensis

Succisa pratensis

Taraxacum officinalis

Umbilicus rupestris

Veronica arvensis

Vinca minor

Viola riviniana

Appendix 3: Herbarium packet material from Ardnagashel, 2018

- 126 Hawthorn twig
- 130 *Russula cynaoxantha* agg. Green
- 129 *Leptogium cyanescens*
- 117 *Usnea*, *Evernia prunastri*, *Parmotrema perlatum*
- 123 *Clitocybe* sp.
- 118 *Pannaria rubiginosa*
- 124 *Trochila ilicis*
- 116 Conifer bark with *Lecanactis subabietina*
- 134 Hawthorn
- 120 *Schizophyllum commune*
- 121 *Laccaria amethystina*
- 122 ? *Orthotrichum lyellii*, *Hookeria lucens*, *Rhytidiadelphus loreus*, *Hypnum cupressiforme* var *resupinatum*
- 111 Oak with *Usnea* sp., *Melanelia subaurifera*
- 114 *Usnea*
- 128 *Castanea sativa* with *Laccaria laccata*, *Laetiporus sulphureus*, *Russula nobilis*, *Parmotrema perlatum*, *Usnea cornuta*
- 131 Mushrooms
- 127 *Sticta fuliginosa*
- 125 Rhododendron leaf plus infection, *Fraxinus excelsior*, *Hedera helix*, *Fagus sylvatica*, *Usnea*, *Ulota crispa*, *Climacium dendroides*, *Pronophytus andina*???, *Lecanactis subabietina*, *Lepraria* on fern
- 112 *Sticta sylvatica* on felled ?Willow
- 115 *Hookeria lucens*
- 109 *Seifertia azaleae* on Rhododendron bud
- 110 *Lobaria scrobiculata*
- 108 Oak with *Pertusaria hymenea*
- 106 *Lomatia ferruginea* fallen but live tree
- 101 Gymnosperm
- 102 *Lobaria pulmonaria*
- 119 *Stereum*
- 113 *Pleurotus ostreatus* on *Grisellinia littoralis*
- 105 *Laetiporus sulphureus*
- 104 *Lecanactis subabietina* on Conifer
- 107 Oak stick with *Parmotrema perlatum*, *Flavoparmelia caperata*, *Evernia prunastri*, *Graphis*, *Usnea rubicunda*
- 102 *Lobaria pulmonaria*
- 119 *Stereum*
- 113 *Pleurotus ostreatus* on *Grisellinia littoralis*
- 105 *Laetiporus sulphureus*
- 104 *Lecanactis subabietina* on Conifer
- 107 Oak stick with *Parmotrema perlatum*, *Flavoparmelia caperata*, *Evernia prunastri*, *Graphis*, *Usnea rubicunda*