Biodiversity of Dead Wood

Fungi – Lichens - Bryophytes

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Key messages

Scotland is home to thousands of fungi, lichens and bryophytes, many of which depend on dead wood as a food source or place to grow. This presentation gives a brief introduction, for each group, to the diversity of dead wood species and the types of dead wood they need to survive.

The take-home message is that the dead wood habitat is as diverse as the species that depend upon it. Ensuring a wide range of these dead wood types will maximise species diversity.

Some dead wood types need special management and may need to be prioritised in areas where threatened species depend upon them.
Dead wood is food for fungi and they, in turn, have a big impact on its quality and ultimate fate.

With thousands of species, each with specific habitat requirements, fungi require a wide diversity of dead wood types to maximise diversity.
Brown rot fungi

The main building block of wood, cellulose, is broken down by the fungi, but not other structural compounds such as lignin.

Dead wood is brown and exhibits brick-like cracking.

Many bracket fungi are brown rotters.

Different fungi rot wood in different ways – the main types of rot are brown rot and white rot.
White-rot fungi degrade a wider range of wood compounds, including the very complex polymer, lignin. Pale wood. More species are white-rot than brown-rot fungi.
Armillaria spp. Honey fungi

Example of a common white-rot fungus
The following slides (7 - 30) demonstrate some of the diversity of wood rotting fungi and the types of deadwood they need.

Note:

• the different fruit body shapes – not just mushrooms!
• some fungi are hardwood specialists and others softwood specialists
• some are generalists while others only grow on certain species of dead wood
• some grown on young, small woody debris and some grow on large logs and buried stumps
• some are early colonisers and others need very old dead wood

DIVERSITY!

Dacrymyces stillatus
Common Jellyspot
Peniophora polygoni

Early colonisers of attached deadwood

Vuilleminia comedens

Waxy Crust

These species are examples of ‘crust’ fungi. The fertile tissue is entirely supported by the dead wood rather than a mushroom or bracket structure.
Pleurocybella porrigens
Angel wings

Grows on well rotted coniferous wood – common on larger plantation brash in Scotland.

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Two common bracket fungi

*Trametes versicolor*  Turkeytail

*Sterium hirsutum*

Deciduous deadwood
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Plicatura crispa

Found on the dead wood of deciduous trees, in particular hazel and beech.

Usually located in rather humid woodlands often in river valleys or loch sides.
Non-specialists on conifers and hardwood.

*Pholiota limonella* on a dead standing birch in Ledmore Wood, Dornoch
These two bracket fungi are common birch dead wood specialists.
Bulgaria inquinans  Black Bulgar

Look out for these black discs (about the size of a 2p) on fallen oak branches.
**Chlorociboria aeruginascens**  Green Elfcup

On fallen branches of oak (mainly)

‘Green oak’ used to make Tunbridge ware

Wood stained blue
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Piptoporus quercinus
Oak Polypore

This very rare relative of the birch polypore is a BAP species with only one known site in Scotland.

It grows on dead wood associated with veteran oaks.

It is protected under Schedule 8 of the Wildlife and Countryside Act 1981, and requires a license to collect or disturb.
Ascocoryne sarcoides  Purple Jellydisc

Common on beech
Panellus mitis Elastic Oysterling

Dead coniferous wood including larch, spruce and pine. Usually on brash and smaller branches but occasionally on larger fallen trunks or branches.

Panellus serotinus Olive Oysterling

Dead deciduous wood, usually large fallen trunks or branches.

Closely related species can have very different dead wood requirements.
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Twigs and small branches

*Exidia recisa*

Fruits on willow twigs

*Exidia repanda*

Fruits on birch twigs
Oudemansiella mucida

Porcelain fungus

This delicate mushroom is an early coloniser of beech dead wood. It can often be seen on attached dead wood up in the canopy, but also on fallen branches.
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Stumps

*Calocera viscosa*
Yellow stagshorn

Conifer stumps
*Tricholomopsis rutilans*

Plums and Custard

Conifer stumps
Tapinella atromentosa
Velvet Rollrim

Conifer stumps
A brown rot fungus
Xylaria hypoxylon
‘candle snuff’ fungus

White-rot fungus

Common on the cut surface of tree stumps
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Ganoderma australe

Deciduous stumps (Brown rot)

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*Coprinus micaceus*

Broadleaf stumps and buried wood

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This fungus captures dead hazel wood before it reaches the ground by gluing it to living stems. This clever strategy helps the fungus avoid competition with soil inhabiting fungi.
**Hymenochaete corrugata**
Glue fungus

Even large woody debris can be suspended above the ground

Photos thanks to E. Holden
Hypocreopsis rhododendri
Hazel Gloves

This attractive fungus is associated with dead hazel wood in western Scotland and a focus of SNH’s Species Action Framework and the UK BAP. It appears to be a parasite of the Glue Fungus rather than a rotter, but still needs dead wood habitat.

It is important to discourage coppicing in these ‘Atlantic’ hazel woods so that a continuity of dead hazel poles is maintained.
Ectomycorrhizal fungi utilise large deadwood in contact with the soil – nutrients rather than carbon.

‘Ectomycorrhizal’ fungi get their sugars from live trees, but degrade dead wood and litter to access nutrients to share with their host tree.

If you carefully roll back a log on a woodland floor, you will usually find tree root tips colonised by fluffy ectomycorrhizal fungi.

David Read et al.
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Not just rotters…..

*Lichenomphalia umbellifera*

This lichen-mushroom, is as at home on large, soggy dead wood as it is on upland soil and amongst sphagnum

The green granules below the umbrella-like mushrooms are a mixture of alga and the fungus

Dead wood provides a habitat rather than a food source in this case
LICHENS

Deadwood is important for lichens:
The hard wood (or lignum) provides a particular surface for a range of specialist lichens, some of which will not occur in other habitats.

It also provides additional habitats for more widely-occurring species which may not be well-represented in an area or location.
*Cladonias* are common on large deadwood, especially when drier conditions reduce competition from bryophytes.
Native pinewoods

Both standing and fallen pines (‘bones’) and the broken, still-attached branches (‘snags’) are important lichen habitats.

Pine ‘bones’ are known to persist for several hundred years, and in reasonably well-lit conditions are an inherent component of the ancient pinewood habitat.
Another fine ‘bone’ providing an important dead wood lichen habitat in Rhidorroch SSSI
‘Pin-head’ lichens are characteristic species of lignum. They prefer hard, dry wood, so often occur on the sheltered underside of leaning trunks or branches, or at the base of standing ‘bones’
Chaenotheca brunneola a pin-head lichen.

The powdery tufts in tiny cups on the ends of the stalks are spore masses.
This pinhead lichen is growing on the underside of a leaning ‘bone’ at Rothiemurchus. Dry lignum is favoured by these species.

Calicium glaucellum
**Chrysothrix chrysophthalma**

The tiny yellow ‘fruits’ of this lignum lichen (photographed in Coulin Pinewood) are less than 2 mm in diameter. The majority of the lichen grows below the surface of the wood.
Elixia flexella

This lignum lichen was photographed on the vertical face of a dry old bone in Coulin Pinewood.
Cavernularia hultenii

Compact colonies of this small leafy lichen are found on the lignum of pine, birch, holly, rowan and even heather in the oceanic western Caledonian pine forests and ravines.
Native hardwoods

all native trees with old exposed lignum are potential habitats for lichens, with ancient oaks particularly important.

New Forest ‘white coats’
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Good quality deadwood habitat will support good quality lichen communities

Attempting to provide an ‘instant’ deadwood habitat rarely proves to be successful

It is better to conserve a good quality habitat: old trees in glades and clearings, with attached dead branches, or large old boughs left where they fall; old hulks standing or lying,

Even old stumps that are exposed or partially exposed are the most valuable deadwood habitats for lichens.

Sandy Coppins
The Stump lichen, *Cladonia botrytes*, a BAP species, requiring old pine stumps in sheltered clearings.

Stump treatments should be avoided to protect this species.
Wood fence posts, gates and rails can provide excellent lignum habitats for lichens, especially in areas where other more ‘natural’ lignum options are absent or rare.
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Forked Hair-lichen *Bryoria furcellata* a BAP species, listed as Red Data Book Vulnerable

Some lignum lichens are rare and require targeted management near known localities

An untreated fence post provides the well lit lignum habitat in this case.
Other useful lignum lichen habitats:

Non-native conifers, especially old specimen trees with deadwood snags or exposed lignum

Non-native deciduous trees especially those with hardwood that is slow to rot

Wooden cladding on barns and outbuildings, especially if neglected and untreated
Deadwood and woodland management:

Rich dead wood lichen floras develop in stable typically well lit conditions, with open conditions persisting for many decades.

Such stability normally requires browsing levels sufficient to suppress most tree regeneration for most of the time.

Think carefully about the impact of grazing management for woodland regeneration on these important open lichen habitats.
BRYOPHYTES

Dead wood provides a substrate safe from competition with larger vegetation and provides protection from leaf litter.

Some mosses and liverworts use deadwood as one of many substrates and others are dead wood specialists.
Some examples of bryophyte dominated dead wood.

Dead wood specialists are most likely to occur where larger mosses are less dominant (right and top).

Bryophytes prefer much moister, sheltered conditions compared to lichens.
Calliergonella cuspidata

A common moss taking advantage of a dead wood substrate that supports it above a thick layer of leaf litter.

This species is frequent in wet woodland.
Mnium hornum and Brachythecium rutabulum

Two more common mosses that typically colonise damp deadwood.
Lophocolea bidentata

A common liverwort that grows on dead wood.

This colony has abundant sporophytes that produce a mass of spores for dispersal to new dead wood.
Nowelia curvifolia a specialist of large, damp old deadwood

Look out for the red/brown hue this species gives to well rotted, bark-free logs in woodland.
Riccardia palmata another common coloniser of large, damp old deadwood

The green fingers of this tiny thalloid liverwort are often associated with Nowellia curvifolia (previous slide and left photo)
Lepidozia reptans

The tiny paw-like leaves of this neat liverwort often dominate rotten stumps in shady conifer plantations.

You’ll need a hand lens to appreciate the attractive features of this species!
Buxbaumia viridis
Green shield-moss

Favors deadwood with sponge-like capacity for holding moisture.

Larger logs offer not just the obvious greater surface area but also better buffering against changes in humidity and greater longevity.

Most Buxbaumia viridis plants are associated with logs that have (or once had) a diameter of more than 20cm.

This moss is well protected by:
- Endangered (RDB)
- National and international legislation
- Biodiversity Action Plan
- Schedule 8 of the WCA
- Annex V Habitats Directive
Continuity of large undisturbed dead wood (conifer and broadleaf) in humid woodland is vital for this species. Woodlands in central and eastern Scotland are an important focus for habitat management.
Anastrophyllum hellerianum is a tiny, nationally scarce liverwort that grows on dead wood.
**Calypogeia suecica**
nationally scarce deadwood liverwort

Nationally scarce deadwood liverworts
Further management advice:
www.plantlife.org.uk
**SUMMARY**

**DIVERSITY and QUANTITY!**

- Hardwood/softwood/species
- Large/small
- Standing/fallen/stumps/buried
- Young/old
- Well lit/shaded
- Dry/humid
- Continuity
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THANK YOU

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Xylographa trunciseda [lichen]
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