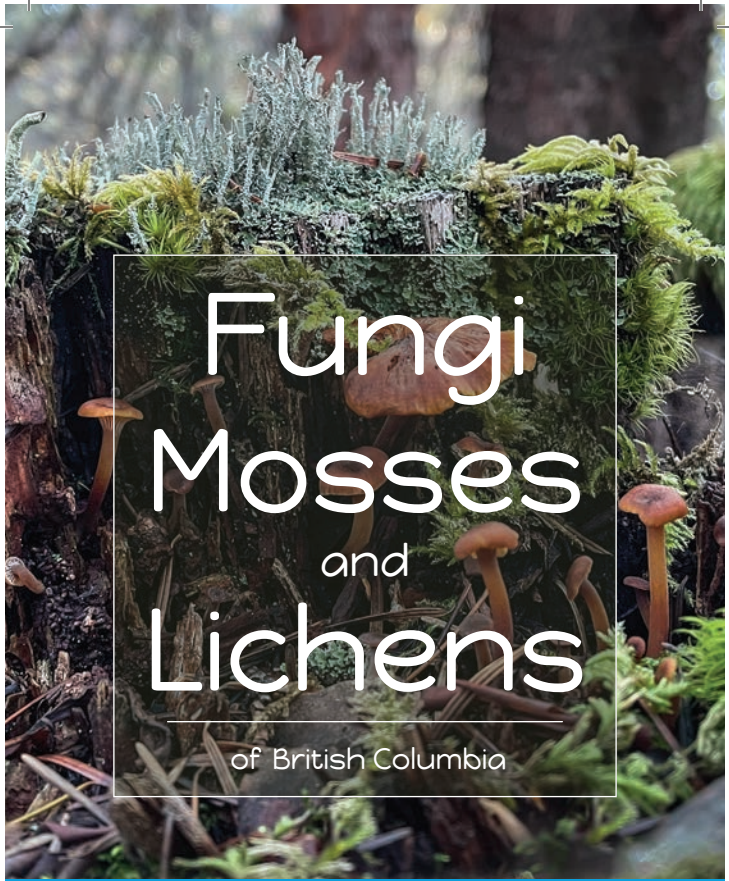

Fungi Mosses and Lichens

of British Columbia

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Exploring fungi, mosses, and lichens

- What habitats do fungi, mosses, and lichens live in? What do they grow on? Where have you found them?
- Look closely at a fungus, moss, or lichen. What features can you observe? How can you tell them apart?
- How are fungi, mosses, and lichens similar to each other? How are they different?
- What creatures can you see living among fungi, mosses, and lichens? What might they be doing?
- How do fungi, mosses, and lichens change with the seasons?
- When you hear the word “fungus”, what comes to mind? What about “moss” and “lichen”? How are they depicted in books, film, music, and other media?
- What roles do fungi, mosses, and lichen play in the ecosystem? What would ecosystems be like without them?
- What are some ways people use fungi, mosses, and lichens?

What are fungi?

(Singular: fungus, plural: fungi)

Fungi share characteristics with both animals and plants but are neither. Like animals, they cannot make their own food (as plants do through photosynthesis) and must digest it from external sources. Like plants, fungi can grow in and on the soil and they reproduce by releasing seed-like spores.

Fungi play vital roles in the environment. Some are *parasitic*, but the majority are *decomposers* and enrich the soil by feeding on dead or decaying matter, or are *mycorrhizal* and form mutually beneficial relationships with plant roots.

What are mushrooms?

Mushrooms are the "fruit" of certain fungi. They are the fleshy structures that emerge from the mycelium that makes up the rest of the fungus. Their purpose is to produce and disperse reproductive spores. Typically, if the structure has the classic cap-and-stipe shape, it is called a "mushroom". If it has a different shape, it is referred to by the general term "fruiting body".

These fruiting bodies come in a wide variety of shapes, sizes, colours, textures, and even scents. Some are edible and sought after; some are deadly poisonous. All are fascinating!

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Fungus Anatomy

Observing these features and parts of a fruiting body will be helpful in identification.

texture


veil remnants


scaly


slimy

cap shape


cylindrical


conical


convex


plane


funnel-shaped

spore structures


closely-spaced gills


irregular gills


pored


toothed


ridged/veined

stipe


centred


off-centred


absent


skirt /ring


volva

What are spores?

Fungal spores are the reproductive cells of fungi, serving a similar purpose to seeds in the plant world. They are produced by the fruiting body of a fungus and are usually dispersed through air currents.

Spore prints

Spore colour is useful for fungus identification, particularly among the capped mushrooms. If you can't see the spores in the field, you can take a spore print:

1. Select a fresh, mature specimen. A mushroom that is too young or too dry won't produce a spore print.
2. Cut the cap off the mushroom and place it gill-, teeth- or pore-side down on a sheet of paper. To see any colour of spores clearly, use half a sheet of white and half a sheet of black paper.
3. Place a bowl over the mushroom and leave overnight (or 3-24 hours). This can be done indoors.
4. The next day, lift the cap to check for a spore print! Note the colour for identification. Similar looking species may have very different spores.

How to appreciate fungi

Our initial reactions to mushrooms seem to be greatly influenced by culture. Some view them as poisonous "toadstools" while others value their gourmet flavours and medicinal benefits.

These cards are not intended to provide identification for the purpose of consumption. *Do not eat anything without expert consultation. Some species look similar to edible species but are harmful or deadly. Respect fungi but don't fear them; they can't harm you unless they are eaten.*

Here are some tips on learning more about fungi:

1. It's all in the details when it comes to identification: what is it growing out of? What does it feel like? What kind of gills does it have? What does it smell like? Handling a mushroom won't harm you, but following up with hand-washing is good practice.
2. Look for a mycological or naturalist group in your area. Many have mushroom walks and other events where you can learn from experts.
3. Take photos! Fungi are natural works of art. You can also use photos to help with identification using guides and apps such as iNaturalist.
4. Forage at the market: A variety of cultivated mushroom species are popping up at grocery stores and farmer's markets. Try something new on your pizza!

What are mosses?

Mosses are simple land plants. Unlike more complex plants, like ferns, flowering plants, and trees (vascular plants), they do not have specialized internal tissues for transporting water and nutrients. Because of this, they cannot become as tall as more complex plants.

Moss leaves are simple and are often only one cell layer thick. Mosses have root-like structures called *rhizoids* that anchor the plant. Mosses do not have flowers and do not produce seeds. Instead, they produce *sporophytes*. A sporophyte is composed of a long stalk with a capsule at the top. The capsule opens to release reproductive cells called spores. These spores are carried by the wind to new locations where they will grow into a new moss.

Moss has traditionally been used for insulating, bandaging (because it can be anti-microbial), and diapering (because it can be absorptive—some mosses, such as sphagnum, can hold up to 20 times their weight in water). Peat mosses have long been burned as fuel and used as soil amendments. However, peat extraction can be ecologically destructive. Peat wetlands serve as important water purifiers and reservoirs, wildlife habitat, and flood prevention systems.


Moss sporophytes

What are lichens?

A lichen is actually multiple organisms working together in a close *symbiotic* relationship. One is an ascomycete fungus, the second is either an alga or a cyanobacterium (or both). The third is a basidiomycete yeast. Lichens come in many colours, textures, and shapes. While some are green and leafy, they are not plants.

Within these composite organisms, the fungi benefit from the carbohydrates produced by the algae or cyanobacteria through photosynthesis. In turn, the algae or cyanobacteria are protected by the filaments of fungi which give the lichen structure. The filaments also anchor the lichen and gather moisture and nutrients from the environment.

Because they are able create their own food, lichens are able to grow in a wide range of environments, including some of the harshest conditions. Some are even able to live on solid rock.

However, lichens can also be very sensitive. Many are are affected by environmental disturbances and can be used to assess air pollution, ozone depletion, and metal contamination.

Lichens are eaten by animals such as moose and caribou and are used as nesting material by birds. People use lichens to make dyes, perfumes, foods, and medicines.

Death Cap (*Amanita phalloides*)

Fly Agaric (*Amanita muscaria*)

Panther Cap (*Amanita pantherina*)

Constricted Grisette (*Amanita constricta*)

Amanitas

Fungi

Where found: Single or in groups. On the ground. As most species are mycorrhizal, they are most common in woods and at forest edges.

Description: Cap: Spherical when young, opening to plane. Amanita colours range from scarlet to orange to brown to white. Often covered with cottony, white patches. Gills: White, closely spaced. Spores: White. Stipe: Usually firm, straight, sometimes widening into a cup-like base (volva). Skirt-like ring near the top.

Notes:

- Amanitas begin as egg-like buttons, surrounded by a soft shell known as a universal veil. As the amanita emerges, patches of the veil may remain on the cap.
- Some species in this group are choice edibles, while others are deadly poisonous. More people in North America have been fatally poisoned by the death cap (*Amanita phalloides*) than by every other mushroom species combined.
- The fly agaric (*Amanita muscaria*) is the iconic toadstool depicted in *Alice in Wonderland* and the *Mario* video games. Due to its hallucinogenic properties, it also plays a part in shamanic rituals in Siberia. It is also eaten by reindeer in that region. Some suggest a link between the species and the depiction of Santa Claus' red and white garments and flying reindeer.

Button Mushroom (*Agaricus bisporus*)

Prince (*Agaricus augustus*)

Meadow Mushroom (*Agaricus campestris*)

Felt-ringed Agaricus (*Agaricus hondensis*)

Agaricus

Fungi

Where found: Scattered, often in groups, sometimes in rings. Decomposers found on the ground, often in forests and in fields.

Description: Cap: Large, fleshy mushrooms, often white or pale in colour. Gills: Fine, white or pink becoming dark brown with age. Spores: Chocolate brown. Stipe: Sturdy, centred, most with a skirt-like ring.

Notes:

- This group includes the familiar 'grocery store' mushroom (*Agaricus bisporus*). Variations of this species are also known as *portobello* and *cremini*. You may have eaten it on pizza. However, some other *Agaricus* species are poisonous enough to make the eater ill.
- Mushrooms have a wide variety of smells that can help in identification. Among this group there are some species that smell like almonds or anise, while others smell unpleasantly like tar or creosote (wood preservative).

Grey Fire Morel (*Morchella tomentosa*)

Landscape Morel (*Morchella importuna*)

False Morel (*Gyromitra esculenta*)

Fluted Elfin Saddle (*Helvella vespertina*)

Morels

Fungi

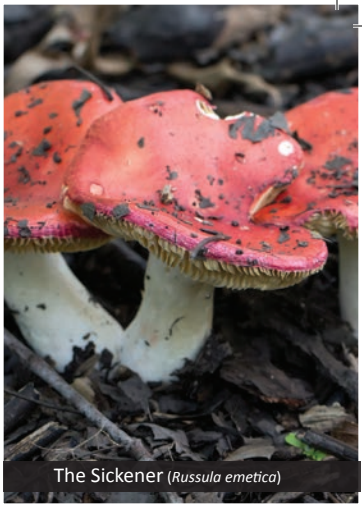
Where found: Scattered, single or in clusters. On the ground, frequently in disturbed or scorched soils. In gardens and orchards, under conifer trees, and on burn sites.

Description: Cap: Hollow, honeycomb texture of ridges and pits. Tan to brown to nearly black. Gills: None. Spores: White. Stipe: White to tan with a hollow centre. When cut in half vertically, the cap of true morels can be seen to be joined to the hollow stem along its entire length.

Notes:

- Morel fungi are prized as a gourmet food. As they are difficult to cultivate, much of the supply is wild-harvested. Commercial harvesting has become a multi-million dollar industry in BC. Pickers flock to areas recently burned by wildfires, as morels are known to fruit in large numbers in this type of habitat.
- Look-alike fungi include the false morels (*Gyromitra* species, considered poisonous) and elfin saddles (*Helvella* species). Both have lumpy caps without distinct ridges and lack the fully connected stem running through their caps.

Shrimp Russula (*Russula xerampelina*)



The Sickener (*Russula emetica*)

Short-stemmed Russula (*Russula brevipes*)

Blackening Russula (*Russula nigricans*)

Russulas

Fungi

Where found: Single or in small groups. On the ground in forests, particularly under conifers. Mycorrhizal with a broad range of hardwoods and conifers.

Description: Cap: Wide caps (often wider than the stem is long) convex to plane to concave with age. Shades of white, red, and burgundy are common. Gills: Fine, brittle. Spores: White to brownish-yellow. Stipe: Centred, short and thick, often white.

Notes:

- The flesh of russulas is rigid and brittle. The stem of a fresh russula will snap cleanly like chalk.
- Russulas are a diverse group with nearly a thousand species. About one hundred of these can be found in BC. They can be so numerous and so hard to identify that they are sometimes dismissed as JARs (Just Another Russula) by mushroom hunters.
- The shrimp russula (*Russula xerampelina*) gets its name from the odour of seafood it gives off as it matures.

King Bolete (*Boletus edulis*)

Zeller's Bolete (*Xerocomellus zelleri*)

Admirable Bolete (*Aureoboletus mirabilis*)

Slippery Jack (*Suillus luteus*)

Boletes

Fungi

Where found: Single or scattered. On the ground under conifers and catkin-forming hardwood trees with which they have mycorrhizal partnerships.

Description: Cap: Thick and fleshy. Convex expanding to plane with age. Colour variable, often brownish or reddish. Gills: A spongy, porous layer beneath the cap in place of gills. Frequently white or yellow. Spores: Olive-brown or cinnamon-brown. Stipe: Centred, fleshy to stout, enlarging downward in some species. Colour variable to species.

Notes:

- Unlike gilled mushrooms, the bolete family release their spores from pores in a spongy layer under the cap. Other types of fungi also have pores but only among boletes can the spongy layer be peeled off cleanly from the cap. Cutting open the sponge reveals a structure of tubes.
- The king bolete (*Boletus edulis*) is valued highly as a gourmet edible mushroom, particularly across Europe. The scientific name *edulis* means “edible”. Its name in other languages shows that it is not only favoured by humans: In Italian, *porcini* means “hog mushroom”, while its Dutch name, *eekhoorntjesbrood*, means “squirrel’s bread”. The name “devil’s bolete” (*Boletus satanas*), on the other hand, speaks to the poisonous nature of that bolete species.

Delicious Milk Cap (*Lactarius deliciosus*)

Bleeding Milk Cap (*Lactarius rubrilacteus*)

Milky latex on damaged gills

Milk Caps

Fungi

Where found: Single or scattered. On the ground in woods or near trees, with which they have mycorrhizal partnerships.

Description: Cap: Often largish and fleshy. Convex with rolled margins, becoming plane, then funnel-shaped with age. Gills: Closely spaced. Spores: White to pale yellow. Stipe: Centred, substantial, and brittle. Snapping cleanly when broken.

Notes:

- The common name for this group, *milk cap,* and the scientific name *Lactarius* both refer to the milky latex these mushrooms weep when damaged. This can be seen most easily by breaking off a piece of the cap on fresh, young specimens. In some species, the latex will stain the flesh and gills. The colour of the latex and the colour of the stain can help with identification.
- The delicious milk cap (*Lactarius deliciosus*) is a good example of the colourful characteristics of this group. The orange flesh and gills of this species exude bright orange latex when cut. Bruised areas stain dark green.

Witch's Hat (*Hygrocybe singeri*)

Yellow Waxy Cap (*Hygrocybe flavescens*)

Parrot Waxy Cap (*Gliophorus psittacinus*)

Golden-fringed Waxy Cap
(*Hygrophorus chrysodon*)

Waxy Caps

Fungi

Where found: Single or in small groups. On the ground in conifer or mixedwood forested areas. *Hygrophorus* species are mycorrhizal, most *Hygrocybes* are as well.

Description: Cap: Small and often colourful. Convex, becoming plane with wavy margins with age. The caps of most species in this group are slimy or sticky when wet. Gills: Thick, uneven, widely spaced, and waxy. Spores: White. Stipe: Centred. Some are hollow. Ring absent.

Notes:

- While they are called *waxy caps*, it is really the waxiness of the gills that unify this group of mushrooms. The microscopic structures of the gills give them the texture of soft wax. This can be experienced by gently running a fingertip over the gills.
- The slimy or sticky layer on the cap may disappear in dry conditions. However, when hydrated by the next rain, the slimy texture will return.
- The waxy caps are mostly in the genera *Hygrophorus*, *Hygrocybe*, and *Gliophorus*. BC is quite rich in *Hygrophorus* species—half of the world's species in this genus are found in BC.

Honey Mushroom (*Armillaria ostoyae*)

Honey Mushroom (*Armillaria ostoyae*)

Fungi

Where found: Often in large clusters. At the base of a wide variety of trees and shrubs. Also on stumps or logs. May emerge from buried wood or roots. Can be a parasite or a decomposer.

Description: Cap: Convex to plane with a wavy margin. Yellowish-brown to caramel to darker shades of brown. Scattered with dark brown scales or fibres. Gills: Closely spaced. Cream ageing to cinnamon. Spores: Cream. Stipe: Long, fibrous, white with cinnamon to yellow at the base. Thick, white ring.

Notes:

- The common name *honey mushroom* refers to the colour, rather than the taste, of the fungi. Like honey, the colour is very variable, ranging from yellows to darker shades of brown. Besides *A. ostoyae*, BC has five other known species of honey mushroom.
- Honey mushrooms decompose dead wood, but they are also known to attack living trees, giving them the alternate name *armillaria root disease*. The mycelium, which can glow in the dark, fans out in long, white tendrils between the wood and the bark, feeding on the roots and lower trunk of the host tree.

Shaggy Mane (*Coprinus comatus*)

Shaggy Mane (*Coprinus comatus*)

Fungi

Where found: Often in groups. On disturbed ground such as roadsides, lawns, and along paths. Decomposer.

Description: Cap: Bullet-shaped cylinders when young, expanding to cones with age. Covered in shaggy, curling fibres. **Gills:** White to pink to grey-black. **Spores:** Black. **Stipe:** Centred, white, hollow.

Notes:

- The shaggy mane is a member of a group of fungi known as *ink caps*. They get their common name from their ability to *deliquesce*, which means to rapidly dissolve the cap and gills into an inky black liquid. Ink caps digest themselves to release their spores. The process begins at the margin of the caps and runs upwards until only the stipe remains a few hours later.
- Shaggy manes are common in urban and suburban areas. Their caps can be found bursting through asphalt and lifting concrete. Large aggregations can include hundreds of mushrooms, lining roadways and ruining tennis courts.

Fairy Ring Mushroom
(*Marasmius oreades*)

Fairy Ring Mushroom (*Marasmius oreades*)

Fungi

Where found: In groups, often in full or partial rings. On lawns and other grassy areas.

Description: **Cap:** To 5 cm across. Convex, becoming plane. With a wide raised area (umbo) in the centre. Light brown to reddish-tan. **Gills:** Widely spaced and uneven in depth. **Spores:** White. **Stipe:** Centred, straight, without a ring.

Notes:

- This mushroom is most often noticed for the rings it forms on lawns. However, this species is not unique in its ability to form rings. In BC, fairy-rings of fungi can be found in fields and forests. Puffballs, blewits, agaricus, and numerous others are known to form rings.
- Rings are formed as a fungus grows out from a single central point. As it uses up the nutrients in the soil, the fungus radiates mycelial roots in all directions. Fruiting mushrooms pop up around the edge of this radius, forming a ring.
- Since the Middle Ages (and likely earlier), there have been many theories as to what caused fairy rings. These have included dancing elves and fairies, witches, dragons, devils, and vomiting toads!

Pine Mushroom
(*Tricholoma murrillianum*)

Pine Mushroom (*Tricholoma murrillianum*)

Fungi

Where found: Single or scattered. On the ground, in sandy soil under conifers, especially pine trees. Mycorrhizal partners with pines and other conifers, as well as some hardwoods.

Description: Cap: Whitish in colour, gaining pinkish-brown or yellow-brown stains or scales with age. A cottony veil covers the cap and gills when young. Gills: Closely spaced. White or cream, staining reddish brown. Spores: White. Stipe: Solid white stem, staining like the cap. Narrowing towards the base. Thick, cottony ring.

Notes:

- Considered a choice edible, particularly in Asia. Because it has not been successfully cultivated and must be wild-harvested, these mushrooms can be fairly costly. Economically, the pine mushroom is the most important species of wild mushroom in BC. Harvest ranges up to 400,000 kg per year, much of which is exported to Japan.
- After a whiff, some may be surprised at the popularity of this mushroom. One of its distinctive features is an odour that has been described as a combination of cinnamon and smelly socks.

Pacific Golden Chanterelle
(*Cantharellus formosus*)

White Chanterelle
(*Cantharellus subalbidus*)

Winter Chanterelle
(*Craterellus tubaeformis*)

Scaly Chanterelle
(*Turbinellus floccosus*)

Chanterelles

Fungi

Where found: Single or scattered. On ground under conifer trees, particularly in older, established forests of Douglas-fir, Sitka spruce, and western hemlock.

Description: Cap: Flesh thick, irregular, cap sometimes with vase-like indent. Gills: Thick, blunt ridges, called veins, run from the margins onto the stem. Spores: White to yellow. Stipe: Fibrous, no clear division between cap and stipe.

Winter chanterelles (*Craterellus tubaeformis*) are less fleshy, with more gill-like ridges and a hollow stem.

Notes:

- Chanterelles are found in North America, Europe, and Asia and are among the most popular types of edible mushrooms. Because of their required mycorrhizal relationship with mature forests, they have not been cultivated. In BC, an estimated 750,000 kilograms of Pacific golden chanterelles are wild-harvested annually.
- While true chanterelles are choice edibles, it is worth noting that some similar species, such as the scaly chanterelle (*Turbinellus floccosus*), can cause stomach upset in some people.

Lobster Mushroom
(*Hypomyces lactifluorum*)

Lobster Mushroom (*Hypomyces lactifluorum*)

Fungi

Where found: Single or in groups. On the ground, especially under conifers. Fungal parasite.

Description: **Cap:** Firm, irregular and cracked. Sometimes yellow, often bright orange to orange-red. **Gills:** Blunt ridges. **Spores:** White. **Stipe:** Thick, no clear division between cap and stipe. Orange.

Notes:

- Lobster mushrooms are actually two fungi in one! They occur when the lobster crust fungus parasitizes the host mushroom, most commonly the short-stemmed russula (*Russula brevipes*). As the lobster crust fungus takes over the tissues of the russula, the form of the russula becomes blunted and takes on a bright orange colour.
- The *lobster mushroom* gets its name from its resemblance to a cooked lobster tail sticking out of the ground. While it is considered a choice edible when cooked, it does not taste like seafood.

Orange Peel Fungus
(*Aleuria aurantia*)

Orange Peel Fungus (*Aleuria aurantia*)

Fungi

Where found: Scattered, often in clusters. On the ground, especially hard-packed areas such as roadsides, gravel paths, and trails. Decomposer.

Description: Fruiting body: Spherical to cup-shaped to irregular saucer with age. Thin flesh. Smooth, orange interior. Textured, lighter exterior. Gills: Absent. Spores: Colourless. Stipe: Usually absent.

Notes:

- Orange peel fungus is common throughout much of BC and lives up to its name by looking remarkably like the peel of an orange discarded by a careless hiker.
- Orange peel is a type of cup fungus. Members of this group release their spores by shooting them upwards from their inner surfaces in a sudden cloud. Because of this, it is very difficult to take a spore print. In addition, the spores of many cup fungi are colourless.
- To trigger a spore cloud, try warming this cup fungus in your hand and gently blowing on it.

Gemmed Puffball (*Lycoperdon perlatum*)

Western Giant Puffball
(*Calvatia booniana*)

Pear Puffball (*Apioperdon pyriforme*)

Bowl Earthstar (*Geastrum saccatum*)

Puffballs

Fungi

Where found: Single, scattered, or in groups. On the ground in grasslands and open forests. Decomposers.

Description: Fruiting body: Round to pear-shaped spheres of firm white flesh when young. Size ranging from 1 to 60 cm. Outer layer smooth, spiney, or crackled depending on species. Gills: Absent. Spores: In a mass at the centre of the ball. White when young, becoming powdery olive brown, brown, or purplish brown at maturity. Stipe: Absent or a slightly elongated base.

Notes:

- Puffball spores develop in the centre of the fruiting body. When the spores are mature, the puffball will become dry and disintegrate, releasing the spores. Some expel their spores through a central opening. The puffball genus *Lycoperdon* means "wolf fart" in Greek, in reference to the dark puff of spores being released. The French-Canadian name *pet-de-loup* means the same thing!
- Many mushroom poisonings are the result of young amanita buttons in their "egg" form being mistaken for edible puffballs. However, if such a button is cut in half vertically, the interior will contain the compressed form of a mushroom with cap, gills, and stipe. True puffballs have uniform flesh throughout.

Western Cauliflower Mushroom
(*Sparasis radicata*)

Yellow Mountain Coral
(*Ramaria rasilispora*)

Orange-red Coral (*Ramaria stuntzii*)

Upright Coral (*Ramaria stricta*)

Coral Fungi

Fungi

Where found: Single or scattered. Mycorrhizal species on the ground under conifers and decomposers found on rotting wood. At the base of living trees in the case of the parasitic western cauliflower mushroom.

Description: Fruiting body: Resembling marine coral. Frilly or fleshy branches expanding outwards from the base. Colours may be vibrant and differ by species. Gills: Absent. Spores: White, yellow-brown, apricot. Stipe: Branched from the base.

Notes:

- The western cauliflower mushroom (*Sparassis radicata*) is somewhat cauliflower-like in appearance. It has also been described as looking like a mass of fresh egg noodles. It is a parasite and can be found at the base of conifer trees with its base buried deep in their roots, feeding on the tree.
- While not all coral fungi are edible, and many are difficult to tell apart, the western cauliflower is an edible exception. It has been successfully cultivated and can be found dried in certain grocery stores.

Hedgehog
(*Hydnum washingtonianum*)

Bellybutton Hedgehog
(*Hydnum umbilicatum*)

Hedgehog Mushrooms

Fungi

Where found: Single or in groups. On the ground in conifer forests. Mycorrhizal with conifers and hardwoods.

Description: Cap: Convex becoming plane, sometimes with a central depression. White to pale orange to orange-brown. Firm and brittle. Gills: Instead of gills, has white to pale orange spiky "teeth" on the underside of the cap. Spores: White. Stipe: Centred to slightly off-centred, firm, cream to peach.

Notes:

- Hedgehog mushrooms generally appear in late fall. They are able to survive the first frosts of winter that turn many other fungi to mush. They also retain their firmness when cooked and are considered a choice edible. Not all toothed fungi are edible though; see the toothed fungi card for other examples.
- Hedgehog mushrooms get their name from their spiky undersides. The bellybutton hedgehog (*Hydnum umbilicatum*) is so named for the navel-like depression in the centre of the cap.

Spirit Gummy Bear (*Pseudohydnum gelatinosum*)

Witch's Butter (*Dacrymyces chrysospermus*)

Alpine Jelly Cone (*Heterotextus alpinus*)

Western Jelly Ear (*Auricularia americana*)

Jelly Fungi

Fungi

Where found: Single, in groups, or densely clustered. Decomposers on decaying wood.

Description: Fruiting body: No distinct cap. Shapes and colours differ by species. Jelly-like flesh. Gills: Absent. Spores: White, yellow, orange. Stipe: Absent or a tapering continuation of the body.

Notes:

- Why 'Spirit gummy bear'? This made-in-BC name relates to the consistency this fungus shares with a gummy bear candy. The white colour of the fungus calls to mind the white bears of BC's coastal rainforest known as spirit bears.
- If you've ever been licked by the rough tongue of a cat, you'll understand why the 'Spirit gummy bear' is also known as the 'Cat's tongue fungus'. The slightly toothed texture on the underside of this jelly fungus has a similar feel.
- Jelly fungi are most abundant and most visible in wet weather. They shrink down to almost nothing when they dry out, but have the ability to swell back up to their original form after the next rainfall.

Bear's Head Fungus
(*Hericium abietis*)

Lion's Mane Fungus
(*Hericium erinaceus*)

Icicle Fungi

Fungi

Where found: Usually single. Decomposers on dead wood of conifers (bear's head). Decomposers on dead wood or parasitic on living hardwood trunks (lion's mane).

Description: Fruiting body: A mass of icicle-like teeth either many-branched or unbranched depending on species. White to cream to yellowish. Gills: Teeth rather than gills. Either many-branched and delicate or unbranched and long. Spores: White. Stipe: Solid base attached to wood.

Notes:

- It takes a strong imagination to see *Hericium abietis* as a bear's head. Another, perhaps more representative, common name for it is *frozen waterfall fungus*.
- Lion's mane fungus (*Hericium erinaceus*) is considered a gourmet edible fungus. It is also being studied for potential medical benefits. It is uncommon in the wild. In some parts of the world, such as the UK, it is so rare that it is illegal to pick or sell it. Fortunately, it can be cultivated successfully and this is taking pressure off wild populations.

Western Varnished Conk (*Ganoderma oregonense*)

Artist's Conk (*Ganoderma applanatum*)

Red Belted Conk (*Fomitopsis mounceae*)

Agarikon (*Laricifomes officinalis*)

Conks

Fungi

Where found: Single or in groups. Some species are parasitic on living trees while others are decomposers on dead trees.

Description: Cap: Knob-like to hoof-like or shelf-like, usully with a hard surface. Often ridged or banded. Gills: A pore-covered surface rather than gills. Pores are small to minute. Spores: Brown to white. Stipe: Often absent or rudimentary.

Notes:

- The term *conk* is British slang for nose, especially a large one. This is believed to be the origin of the name for these rounded fungi that stick out from the trunks of trees, like a nose does from a face. In mycological terms, 'conk' is a general term for fungi that fit this description, as well as having a hard surface and being long-lived.
- Many species of conks will continue to grow year after year, with each growing season forming a distinct band. This allows their age to be calculated, similar to counting the rings in a tree. Specimens as old as 50 to 70 years have been recorded.

Oyster Mushroom
(*Pleurotus ostreatus* group)

Oyster Mushroom (*Pleurotus ostreatus* group)

Fungi

Where found: Frequently grows as overlapping shelves. On dead hardwood logs, stumps, and wood chips. Decomposer.

Description: **Cap:** Smooth, shelf-like with soft, rubbery flesh and a rolled margin. White to pale grey or grey-brown. **Gills:** Closely spaced, running into the stipe. **Spores:** White to pale lilac. **Stipe:** Absent or off-centre continuation of the cap.

Notes:

- Oyster mushrooms are considered a choice edible when cooked. However not all shelf-like gilled fungi are– even those that also have "oyster" in their names. Happily, through successful cultivation, the edible varieties are becoming more commonly available in grocery stores.
- The oyster mushroom is a popular species for use in *mycoremediation*. This is the practice of using fungi in environmental cleanup. Oyster mushrooms are especially useful because the fungus can break down organic compounds such as petroleum (from oil spills), and make it less harmful to the environment.

Strawberries and Cream
(*Hydnellum peckii*)

Hawk's Wing (*Sarcodon imbricatus*)

Orange Tooth (*Hydnellum aurantiacum*)

Violet Tooth (*Hydnellum fuscoindicum*)

Toothed Fungi

Fungi

Where found: Single or in clusters. On the ground in conifer forests. Mycorrhizal with conifers and other plants.

Description: Cap: Convex becoming flat or funnel-shaped. Irregular roundish shape. Flesh thick and tough. Colours and textures vary by species. Gills: Tightly packed spiky teeth, sometimes running to the base of the fungi. Spores: Brown. Stipe: Present in some species. A tapered continuation of the cap in others.

Notes:

- Sadly, the 'strawberries and cream fungus' is named for the deep red drops of liquid that form on its spongy cream-coloured surface rather than its flavour. It is said that the taste is intensely nauseating.
- Several species of Hydnellum have a relationship with a curious plant called the gnome plant (*Hemitomes congestum*). This plant lacks the ability to photosynthesize and instead steals sugars from other plants by using the fungus's mycelial root system to tap into the plants. It's not clear if or how the fungus benefits from its role.

Chicken of the Woods
(*Laetiporus sulphureus* group)

Dyer's Polypore (*Phaeolus schweinitzii*)

Turkey Tail (*Trametes versicolor*)

Blue Cheese Polypore
(*Postia caesia*)

Polypores

Fungi

Where found: Single or in clusters. Some are parasitic on living trees and their roots (may appear to be growing on the ground) as well as decomposers of dead wood.

Description: Fruiting body: Irregular, often shelf-like. Spongy to tough, depending on age and species. Colours variable with species. Gills: Tightly pored surface rather than gills. Unlike boletes, the layer cannot easily be detached. Spores: Often white or pale. Stipe: Absent or a tapered continuation of the fruiting body.

Notes:

- A highly variable group of fungi united by their appetite for wood and a pore-covered surface that expels their spores. The word *polypore* means "many-pored".
- Dyer's polypore (*Phaeolus schweinitzii*) attacks the roots and base (known as the butt) of trees and is known to foresters as *Schweinitzii butt rot*. The fungus can be used to dye wool and other materials a range of colours from green to gold to orange and brown. This has led to the fungus' other (perhaps less amusing) common name.
- Chicken of the woods (*Laetiporus sulphureus*) gets its name from its taste and texture, which have been favourably compared to chicken. However, as with all species of fungi, they can cause an allergic reaction in some people.

Shaggy Peat Moss
(*Sphagnum squarrosum*)

Shaggy Peat Moss (*Sphagnum squarrosum*)

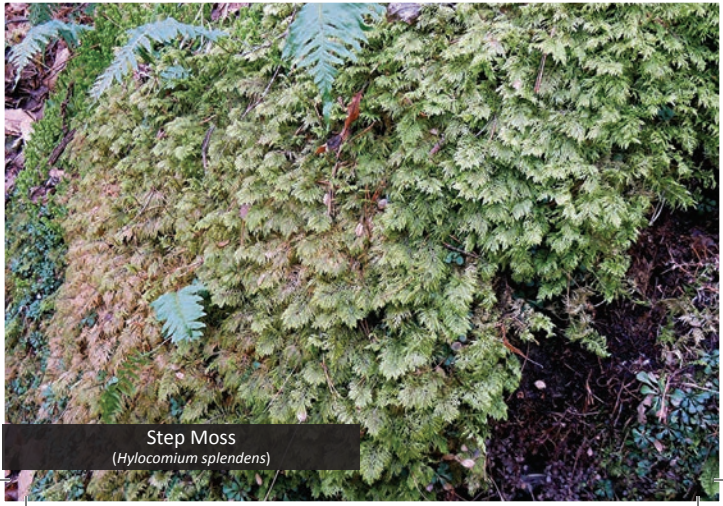
Moss

Where found: Low elevations to subalpine. In loose mats in moist forest areas and in swamps and wetlands. Not found in bogs, unlike other *Sphagnum* species.

Description: Upright shoots with clusters of branches on a main stem. Bends in the branches give it a coarse, shaggy texture. Branches are lined with leafy stems and topped with a dense clump of short stems. These compact heads composed of young clusters are distinctive to sphagnum mosses. Ranges from whitish to yellow-green to darker green in the shade.

Notes:

- Known for its softness and absorbency, traditional uses for this moss include baby diapers, personal hygiene, wound dressings, and bedding. Mosses also have anti-microbial properties which make them even more ideal for these uses.
- Most common on the coast, but found throughout BC.
- Shaggy peat moss spores are released from their capsule by an implosive mechanism. Popping sounds of imploding capsules can be heard in areas of fruiting sphagnum on warm, sunny days.



Step Moss
(*Hylocomium splendens*)

Step Moss (*Hylocomium splendens*)

Moss

Where found: Common in lowland to middle elevation forests with humus-rich soil, forming the dominant ground cover. Also grows on rotten logs; often in Western redcedar and hemlock forests.

Description: Red-brown, arching shoots with feathery green branches in a triangular formation. New growth forms as a new shoot branching off the previous, part way along its length.

Notes:

- 'Step moss' gets its common name from its step-like growth pattern. Every growing season, a new shoot segment branches from the previous shoot. Because of this, it's possible to estimate a specimen's age by the number of "steps" it has grown.
- Step moss is used commercially by florists for garden plant boxes and hanging baskets. It is also known to be used for filling the gaps between the logs of log cabins.
- Also known as 'glittering woodmoss' and 'splendid feather moss' because of its delicate, feathery fronds.

Crane's Bill Moss
(*Atrichum selwynii*)

Crane's Bill Moss (*Atrichum selwynii*)

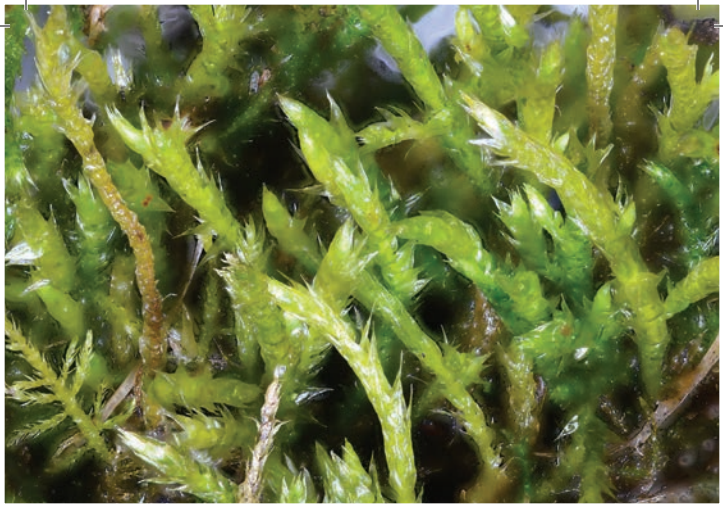
Moss

Where found: Found at all elevations, but ideal habitat is more common at lower elevations. Forms loose mats on moist, shaded soil. Especially on disturbed and exposed soil, like that caused by an uprooted tree.

Description: A rich green, unbranching carpet of fairly uniform growth. Leaves are loose and wide-spreading when wet, becoming upright and twisted when dry. Spore-bearing structures (sporophytes) are often present.

Notes:

- The sporophyte capsules, on their long, graceful stalks (known as setae), are said to resemble the heads of sandhill cranes, giving this moss its common name.
- Crane's bill moss is most common in BC along the coast and through the southern region of the province.
- Mosses in this genus are sometimes used in Japanese tea gardens as an attractive ground cover.



Lawn Moss
(*Brachythecium albicans*)

Lawn Moss (*Brachythecium albicans*)

Moss

Where found: A common moss of dry grasslands. Also occurs at high elevations, especially in grassy areas. Favours open, dry sites such as pastures, road edges, and trails.

Description: Forming mats of creeping, irregularly-branched shoots. Yellowish to whitish-green.

Notes:

- Most common in the southern region of the province, but also scattered to the far north of BC.
- This species is variable, often producing very thin shoots, but usually specimens also include some larger, more typical shoots. Branches of specimens as long as 18 mm have been measured.
- Not all mosses are found in moist, shady forests. Some, like lawn moss, favour open dry sites. In the arid southern Interior of BC some mosses, lichens, and algae form biological soil crusts, critical in nutrient cycling, water retention, and soil stabilization.

Oregon Beaked Moss
(*Kindbergia oregana*)

Oregon Beaked Moss (*Kindbergia oregana*)

Moss

Where found: Favours lower elevation coniferous rainforests where it forms large mats on humus, tree trunks, rotten logs and rocks. Found in all vegetation types near the coast, but confined to humid forests in the Interior.

Description: Large plants form loose, creeping mats. Interwoven yellow-green to orange-green, feathery, fern-shaped branches. The red-brown sporophytes are common and grow on the side of the stem. Stems can be 6-30 cm long!

Notes:

- *Beaked moss* refers to the moss's spore capsules, which, when they are young, are covered with a cap (known as a calyptra), that bends upward to make the spore capsule resemble a bird with an upward-scooped beak, such as a Canada goose.
- Many invertebrates use the moist environments of rainforest mosses, such as Oregon beaked moss, as microhabitats. Nematodes, tardigrades (water bears), mites, nitrogen-fixing cyanobacteria, and others are all found in the mosses.

Electrified Cat's-tail Moss
(*Hylocomiadelphus triquetrus*)

Electrified Cat's-tail Moss

(*Hylocomiadelphus triquetrus* - *formally Rhytidiadelphus triquetrus*)

Moss

Where found: In sun or shade on well-drained sites. Primarily terrestrial on forest floors. Also grows on cliffs and logs. Common across the province, particularly near the coast, in forests and open areas.

Description: Forms loose mats of fuzzy, yellow-green, branching shoots. The interwoven branches and coarse leaves give it an irregular appearance.

Notes:

- Other common names for this moss include 'rough gooseneck moss' and 'big shaggy-moss' because of its untidy look. However, who would choose to use those names when the colourful name 'electrified cat's-tail moss' is available?
- This moss is found in many areas of North America and Europe, wherever there are extensive woodlands.

Bent-leaf Moss
(*Rhytidiadelphus squarrosus*)

Bent-leaf Moss

(*Rhytidiadelphus squarrosus*)

Moss

Where found: From pastures to lawns to golf courses, this moss species is almost always associated with human settlement. In BC, it is found across the province, most frequently in the lawns and grassy areas of cities and towns along the coast.

Description: Forms extensive mats of branching, green stems. Leaves are bent at right-angles from the stem, forming a spiky star-shape around the stem when viewed from above.

Notes:

- This species of moss is widespread across North America and Eurasia. In the United States it is known as 'square gooseneck moss', and in the United Kingdom the common name is 'springy turf-moss'.
- Bent-leaf moss has been introduced to New Zealand and Australia where it is now an invasive species.

Plume Moss
(*Dendroalsia abietina*)

Plume Moss (*Dendroalsia abietina*)

Moss

Where found: In BC it is most frequently found densely covering the trunks and large branches of bigleaf maple and garry oak. Also found on other trees such as poplar and on rocky cliff-faces. The southern coastal region of BC is the northern limit of its range.

Description: Large, olive green, downward-hanging stems. Leaves form fern-shaped plumes. When dry, these plumes curl inwards. Sporophytes grow on short stalks along the underside of the stems of female plants.

Notes:

- Plume moss is often *epiphytic*, meaning that it largely grows on the surface of another plant (trees). Epiphytes collect moisture and nutrients directly from the air and from debris around them.
- Plume moss is *endemic* to the West Coast of North America, meaning that it is not found anywhere else in the world.

Lungwort
(*Lobaria pulmonaria*)

Lungwort (*Lobaria pulmonaria*)

Lichen

Where found: Grows most commonly on trees, especially hardwoods. On the south coast of BC it favours bigleaf maple and Garry oaks. Grows in open, humid forests at lower elevations.

Description: Forms large, loosely attached leaf-like, lobed sheets. Strong, irregular ridges with deep indents between ridges. Pale bluish-green to bright green above, white with brown network below.

Notes:

- Early European doctors used lungwort to treat pneumonia and other lung diseases. They thought that the lichen resembled human lung tissue, and based on a theory called the *Doctrine of Signatures*, they believed that materials that resembled a body part could be used to treat an ailment of that body part. There is no evidence of actual medicinal benefits resulting from this theory.
- Lungwort is particularly sensitive to air pollution and will not grow in areas of poor air quality and acid rain.
- People are known to use lungwort in the dyeing of wool, the tanning of leather, the making of perfumes, and as an ingredient in brewing.

Common Witch's Hair
(*Alectoria sarmentosa*)

Common Witch's Hair (*Alectoria sarmentosa*)

Lichen

Where found: Most common on conifers in temperate rainforest at middle to upper elevations. Preferring old-growth forests. Found along the coast of BC as well as in humid forests of the Interior.

Description: Forming long, pale green clumps of intricately branched, hair-like threads that can hang off tree branches in large mats over a metre long.

Notes:

- This lichen grows above the ground on tree branches and receives all of its moisture and nutrients from the air. Because of this, Common witch's hair can be collected and analysed to monitor air quality and detect and identify air-borne pollutants.
- Common witch's hair often spreads when fragments of a mat detach and are blown to new sites.
- This lichen is food for Sitka black-tailed deer and caribou, especially in winter when food is scarce. They will browse it from where it hangs on low branches and from the ground after storms.
- Old man's beard (*Usnea longissima*) is a similar-looking species. A distinguishing characteristic of this species is that its branches of have numerous right-angle side branches.

Frog Pelt
(*Peltigera neopolydactyla*)

Frog Pelt (*Peltigera neopolydactyla*)

Lichen

Where found: Common at all forested elevations, on rocks, soil, moss, and dead wood. In open to shady habitats. Found throughout humid regions of BC, absent from the dry interior and northern boreal regions.

Description: A large, broadly lobed, leaf-like lichen. Smooth and olive-green to bluish-grey above, whitish and cottony underside, with distinct veins. Reddish-brown, curled, spore-bearing discs (apothecia) common along the margins.

Notes:

- The word for this and similar lichens in the Gitksan language (from the region of BC known as the Skeena Valley in English) translates as “frog’s blanket”.
- All species of *Peltigera* associate with the nitrogen-fixing cyanobacteria, *Nostoc*, a type of fresh-water blue-green algae. Nitrogen fixation is important because it is the process of extracting nitrogen from the air and converting, or ‘fixing’ in a form required for plant growth.

Ragbag Lichen
(*Platismatia glauca*)

Ragbag Lichen (*Platismatia glauca*)

Lichen

Where found: Common and occurring at all elevations. On trees in open and shady forests.

Description: Large, medium-lobed, forming leafy sheets 5 to 10 or even 20 cm across. Margins are frilly and often have a ragged, tattered look. Pale bluish-green to whitish-grey above, white to black beneath with a shiny texture.

Notes:

- Ragbag lichen is found on every continent including Antarctica! Its wide distribution suggests that it is an evolutionarily old species.
- Ragbag and other lichens are an important component of bird nests. Hummingbird nests are tiny cups made of lichen and plant fibres woven together with spider webs. The lichen acts to camouflage the nest, making it appear to be part of the branch it is resting on.

Green-Pea Mushroom Lichen
(*Lichenomphalia umbellifera*)

Green-Pea Mushroom Lichen

(Lichenomphalia umbellifera)

Fungi/Lichen

Where found: Occurs across BC, particularly in humid regions. Frequently found on mossy, moist, decaying wood.

Description: The mushroom fruiting bodies are the most noticeable elements and are often found in groups. Caps are yellowish-tan with a wavy margin and widely-spaced gills. The base of the fruiting body is surrounded by tiny, green granules. These granules are made of algae surrounded by fungal threads. Together they form a lichen.

Notes:

- *Lichenomphalia* is a group of lichenizing fungi that form mushrooms - a rare thing for a lichen. This species exists at the boundary of a lichen and a fungus, its fungal threads only barely holding the pea-green granules at its base together. It feeds not only on sugars from its photosynthetic algal cells, but also on the wood that supports it and which the fungus helps to decay.
- When referring to its mushroom aspect, this species is commonly known as the 'Lichen Agaric'. In many lichens, reproduction happens primarily through fragmentation, in which a piece of a lichen breaks off and continues to grow elsewhere. *Lichenomphalia* species, however, can reproduce through fungal spores and acquire their algal and cyanobacterial partners from the surrounding environment.

Elegant Sunburst Lichen
(*Xanthoria elegans*)

Elegant Sunburst (*Xanthoria elegans*)

Lichen

Where found: Found across BC and throughout much of the world on limestone-rich rock, bark, and occasionally on bone. Favours nutrient-rich areas near bird and rodent perches.

Description: Bright orange to dark orange. Growing in roughly circular shapes, massing into irregular patches. While quite thin, the lobes of the outer areas have slightly leafy texture and swell when wet.

Notes:

- The orange pigments produced by this lichen help to protect it from sunlight. Specimens growing in open areas produce more pigment and have a deeper colour than those in shaded areas. The carotenoids that form these pigments are the same found in pumpkins, carrots, and shrimp.
- This lichen is incredibly resilient in extreme environments. As part of an experiment, the elegant sunburst was taken into space. It was able to survive an 18-month exposure to solar UV radiation, cosmic rays, a complete lack of moisture, and varying temperatures!

Questionable Rock-Frog
(*Xanthoparmelia cumberlandia*)

Questionable Rock-Frog

(*Xanthoparmelia cumberlandia*)

Lichen

Where found: In BC it is found at lower elevations, particularly through the southern half of the province. Common acidic rocky outcrops and boulders, especially granites and sandstone.

Description: Pale greenish-grey and roughly disc-shaped. The small, leafy lobes lie against the rock surface. The spore-bearing apothecia form small, brown discs with upturned edges scattered across the surface.

Notes:

- Who would use this lichen's other common name 'Cumberland Rock-shield' when 'Questionable Rock-frog' is an option? 'Questionable' refers to its unsettled taxonomy. 'Rock-frog' refers to its (remote) resemblance to a rather dry frog lying flat on a rock, likening the lichen's lobes to a frog's toe pads.
- The genus *Xanthoparmelia* is extremely large and contains more that 400 species worldwide. It is best represented in arid habitats, particularly in the American southwest.

Pixie Cup
(*Cladonia pyxidata*)

Trumpet Cup
(*Cladonia fimbriata*)

Pixie Cup (*Cladonia spp.*)

Lichen

Where found: Forming colonies at all elevations on mineral-rich soil, moss, and humus. Especially common in open sites.

Description: Small (1-1.5 cm tall), upright lichen with a cup-like top flaring from a narrower stem. Greyish-green with a warty or powdery texture. Small, brown spore-bearing structures sometimes form form around the lip of the cup.

Notes:

- The Trumpet cup lichen (*Cladonia fimbriata*) looks similar to the Pixie cup lichen (*Cladonia pyxidata*) but has a more grainy texture.
- The goblet-like shape helps disperse the spores by lifting them higher into air currents and launching them when a raindrop hits the cup.
- Species of the genus *Cladonia* come in numerous shapes. Some like the pixie cups are minute with central stalks. Others, including species known as reindeer lichen, resemble dried moss and spread over large areas. These lichens are an important food for caribou (known as reindeer in Europe), especially further north in the tundra region.

Devil's Matchstick
(*Pilophorus acicularis*)

Lipstick Powderhorn
(*Cladonia macilenta*)

Devil's Matchstick (*Pilophorus acicularis*)
Lipstick Powderhorn (*Cladonia macilenta*)

Lichen

Where found: Both are common, particularly in moist forests. Devil's matchstick favours rock, often near waterfalls. Lipstick powderhorn can be found in low-elevation habitat on bark and decaying wood close to ground level.

Description: While not closely related, both of these lichens share a club-like form. Both grow in clusters of thin, pale grey stalks topped with ball-shaped *apothecia* containing the lichen's spores. On Devil's matchsticks these are black and on Lipstick powderhorn they are bright red.

Notes:

- Hopefully the evocative and curious names, shapes, and colours of these – and other – tiny organisms will inspire you to take a closer look at the natural world. An excellent tool to help with your exploration is a hand lens or *loupe*.

  One of these lenses will allow you to see small details more clearly, opening up a whole new, tiny world. A folding model with 10x magnification can easily be hung on a string around your neck and taken on your next adventure!

Dog's Vomit (*Fuligo septica*)

Wolf's Milk (*Lycogala epidendrum*)

Tapioca Slime (*Brefeldia maxima*)

Salmon-Eggs (*Trichia decipiens*)

Slime Mould

Myxomycetes

Where found: In shaded, moist forests with lots of decaying matter. Sometimes moving to drier, more open locations.

Description: Immature slime moulds can often be seen as a network of slimy filaments in and on rotting logs. When mature, slime moulds will migrate to drier, open areas and transform into rigid fruiting bodies. These forms differ by species. Some form clumpy masses while others take on more defined shapes such as brightly coloured spheres. As they are often mistaken for fungi, slime moulds are included in this collection.

Notes:

- Like animals, slime moulds are mobile. Like fungi, slime moulds form fruiting bodies that produce spores. Based on their unique nature, slime moulds are in their own group, the Myxomycetes, which are neither animal, plant, nor fungus. Over 100 species of Myxomycetes have been described in BC.
- Slime molds are ecologically important as significant decomposers and nutrient recyclers.
- As it moves, a slime mold leaves behind a trail of slime. As it forages, the slime mould will strongly avoid contact with its own trail. The slime mould's behaviour strongly suggests that it can sense the trail and uses it as an external memory system to recognize and avoid areas it has already explored. This is similar to behaviour of foraging ants, but slime moulds do it without a brain!

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Terminology

Apothecia: Usually disc-shaped fruiting bodies on which the spores of some lichens are produced.

Button: A young mushroom whose cap has not yet opened.

Deliquescing: Dissolving into a liquid.

Fruiting body: A fungal structure containing spores.

Fruiting (verb): The emergence of a fruiting body.

Margin: The edge of a surface, such as a mushroom cap.

Mycelium: A network of microscopic fungal filaments.

Mycological: Relating to the study of fungi.

Mycoremediation: The use of fungi to break down toxic waste that has been released into the environment.

Mycorrhiza: A symbiotic relationship between the root of a plant and a fungus that colonizes the plant root.

Parasitic: Living in or on an organism of another species and deriving nutrients at the other's expense.

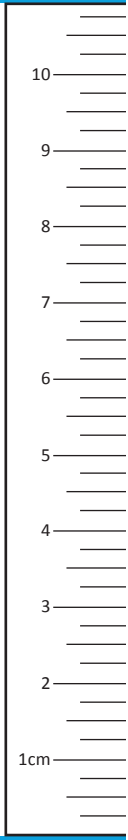
Decomposer: Feeding on dead or decaying organic matter. Organisms who do this are also known as saprobes.

Sporophyte: A capsule, sometimes supported on a thin stalk (seta), that contains a moss's reproductive spores.

Symbiotic: A relationship between two organisms of different species living together.

Umbo: A raised area at the centre of a mushroom cap.

Universal veil: A protective membrane initially covering the entire fruiting body of some mushroom species.



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