



Welcome
to the
Museum

ADMIT ALL

Fungarium ACTIVITY BOOK

Curated by KATIE SCOTT and ESTER GAYA

Colouring,
drawing,
puzzles
& facts!

B
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Royal
Botanic
Gardens **Kew**

Spot the difference

(there are 10 differences to spot)



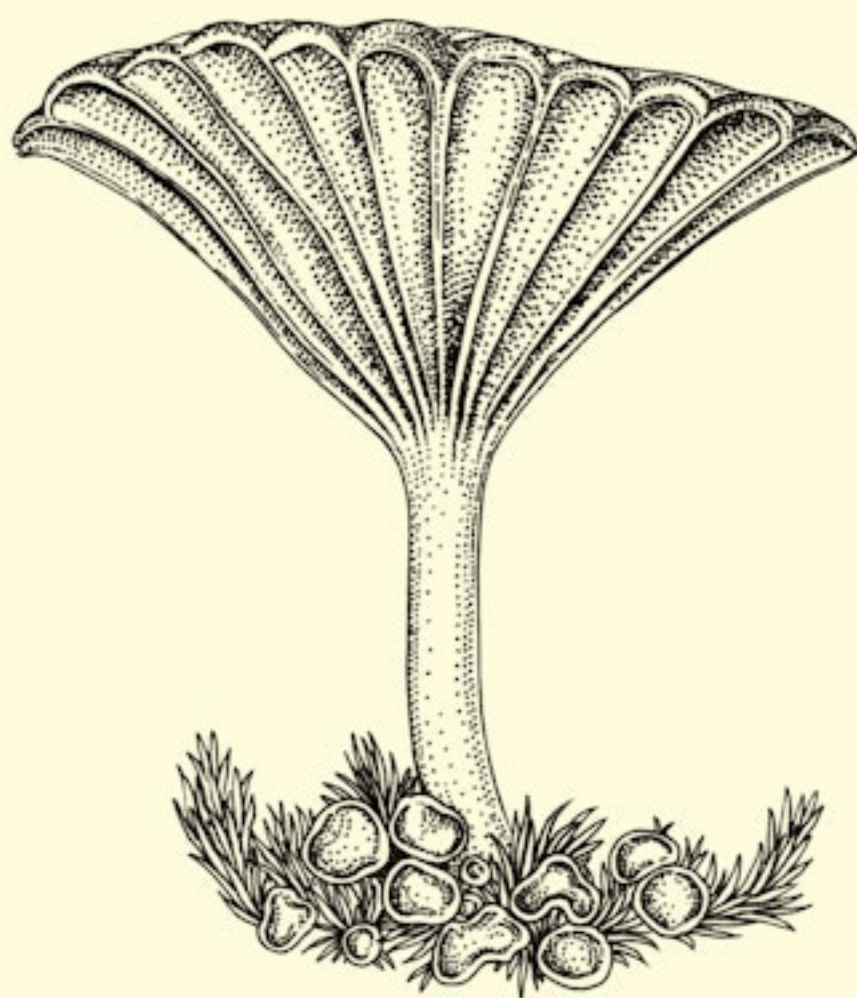
Answers

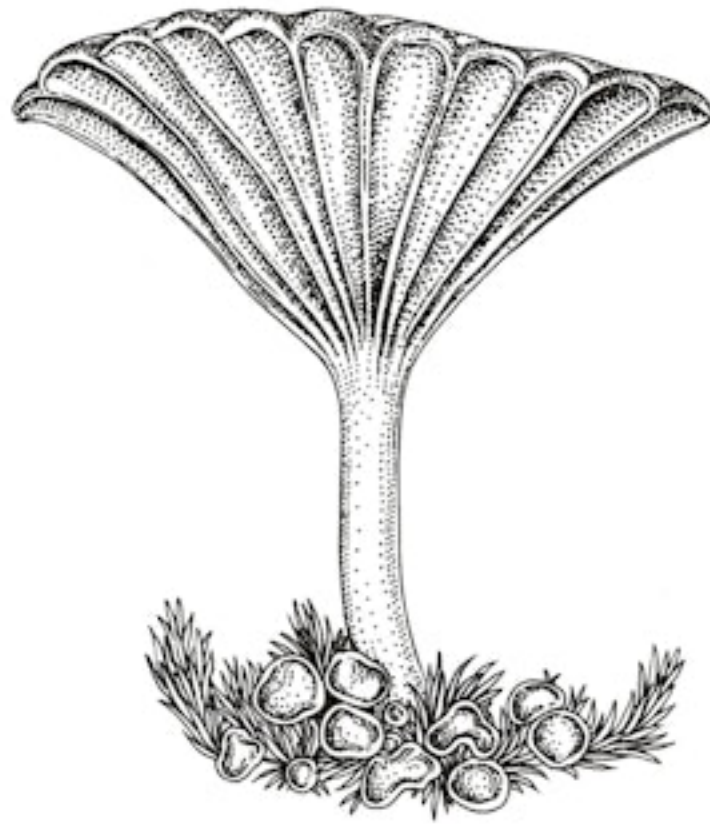


Tropical forests

Green all year round, tropical forests don't have marked seasons, so fungi are seen sporadically throughout the year. Scientists estimate that there are likely to be six to seven times as many fungi as plants growing in any one area. This makes the tropics an amazing source of unexplored fungal diversity.

Colour in this umbrella basidiolichen
and draw the forest floor





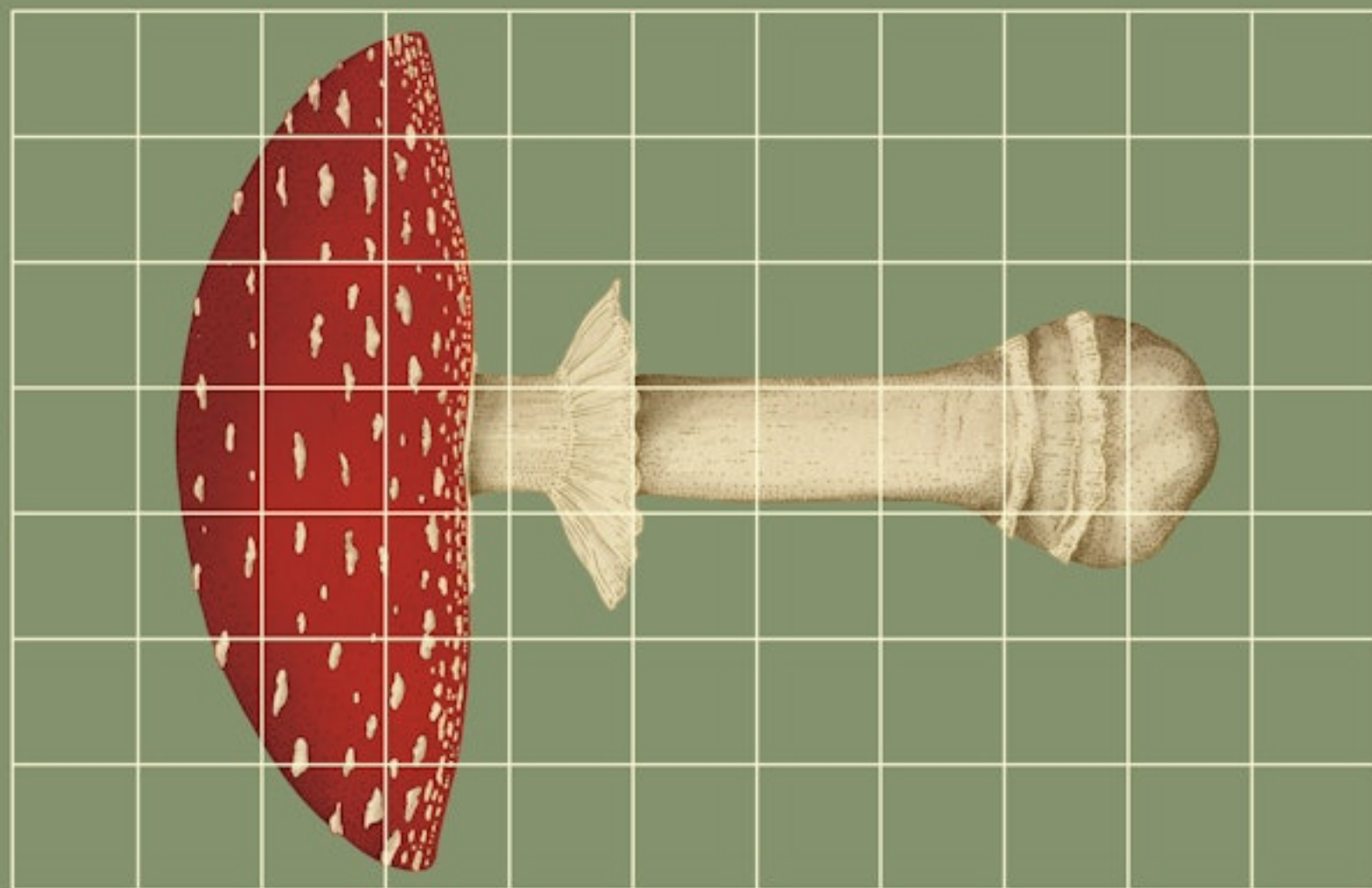
Umbrella basidiolichen

Lichenomphalia umbellifera

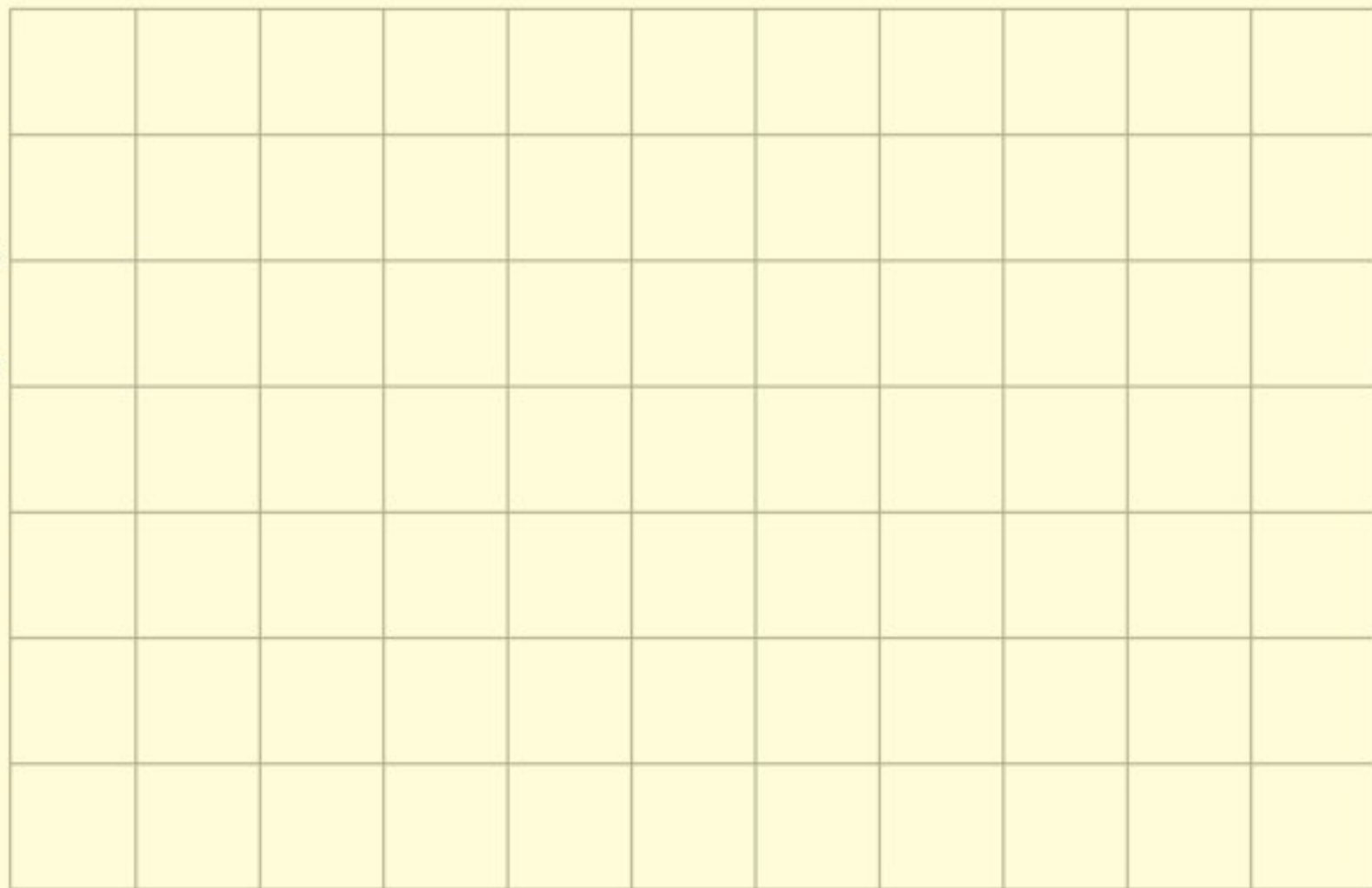
Lichens are the result of a relationship between fungi (mycobionts) and another photosynthesising organism.

This is a rare example of a basidiolichen where the mycobiont is a mushroom. The algal cells are in squamules (small, scale-like lobes) at the base.

Fly agaric



Draw the fly agaric



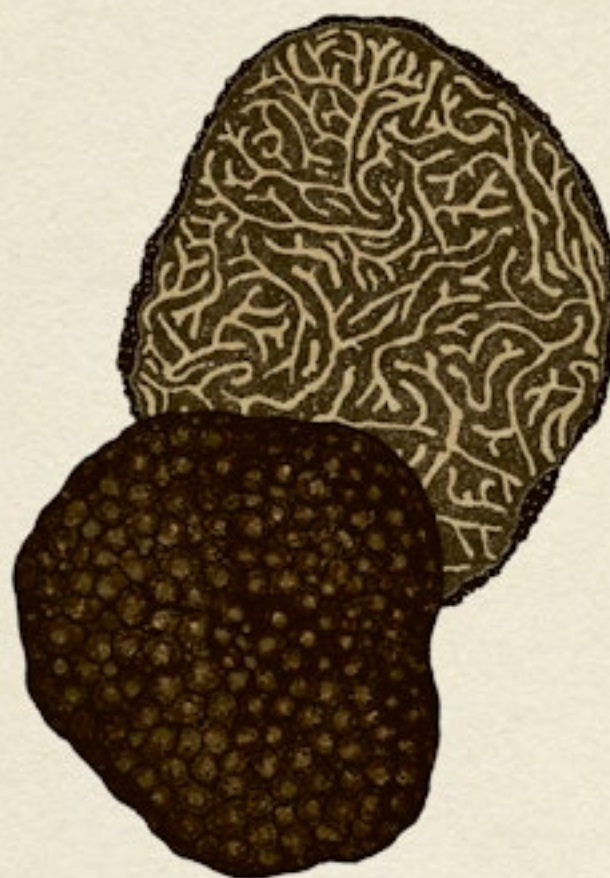


Fly agaric

Amanita muscaria

This widespread species is often called a toadstool. The striking red and white fly agaric has been used to catch flies and also in religious rituals by shamans because of its hallucinogenic properties.

Match these edible fungi to their names



Matsutake Black truffle The true morel Zeller's bolete



Answers



Matsutake

Tricholoma matsutake

Matsutake can be found in coniferous forests in Asia, Europe and North America.



Black truffle

Tuber melanosporum

The black truffle of southern Europe is one of the more expensive edible species in the world.



Zeller's bolete

Xerocomellus zelleri

This edible bolete is found in western North America.

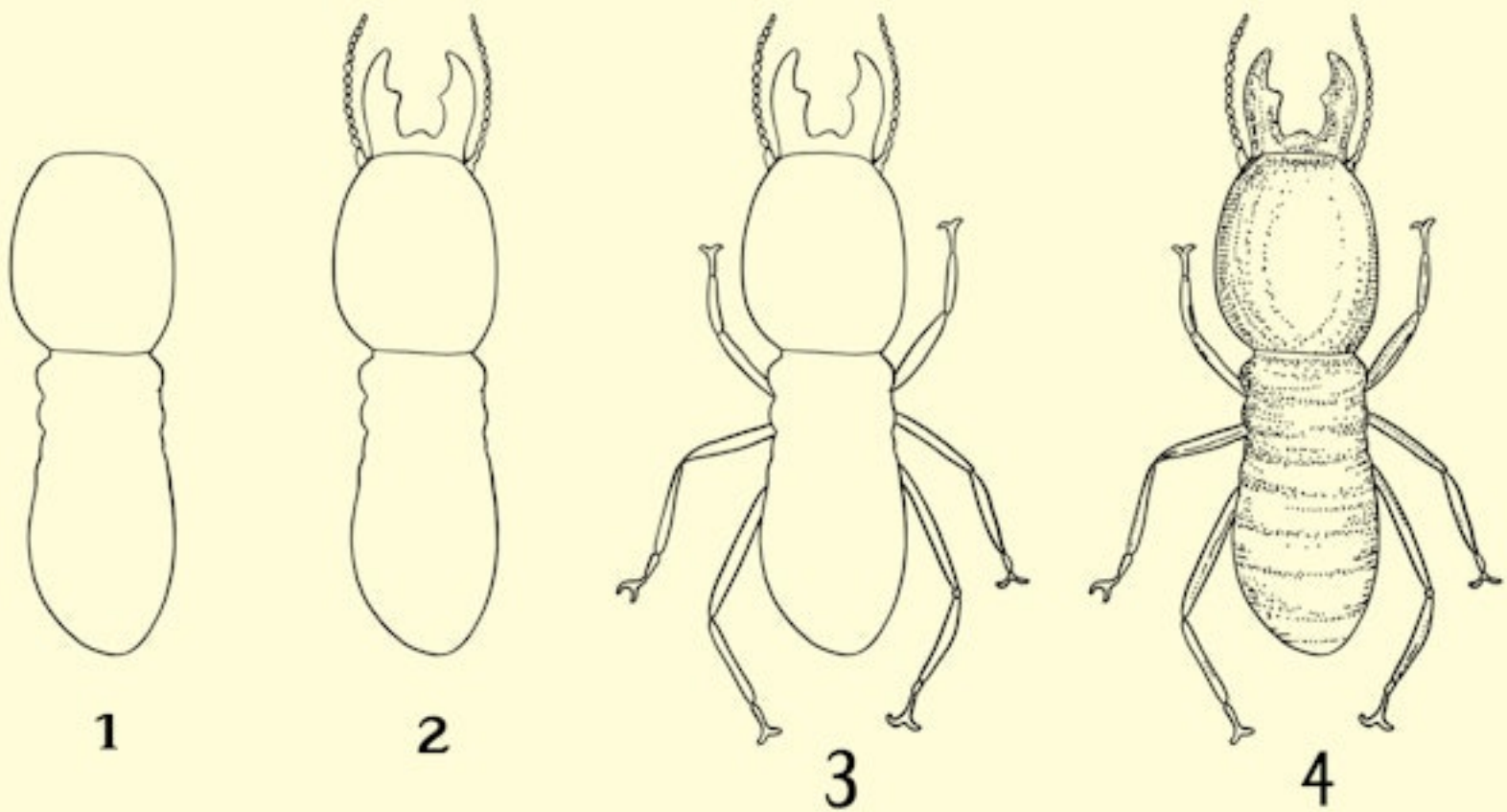


The true morel

Morchella esculenta

The true morel is common in Europe. It looks similar to the poisonous false morel.

How to draw a fungus-growing termite



Try it yourself



Fungus-growing termite

Macrotermes natalensis

Like ants, termites have been growing and farming fungi for millions of years. Termites have big heads with strong jaws to protect themselves. You can find these termites throughout Africa and in Southeast Asia.

Circle all the bracket fungi



Answers



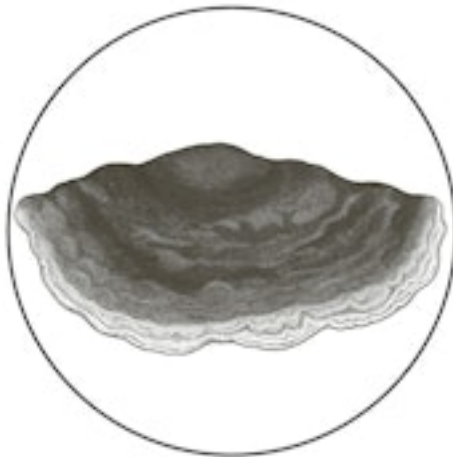
Death cap



Fly agaric



Beefsteak fungus



Giant elm bracket



Shaggy scalycap



Waxcaps



Blue roundhead



Oak polypore



Fly agaric

Draw more dark honey fungi



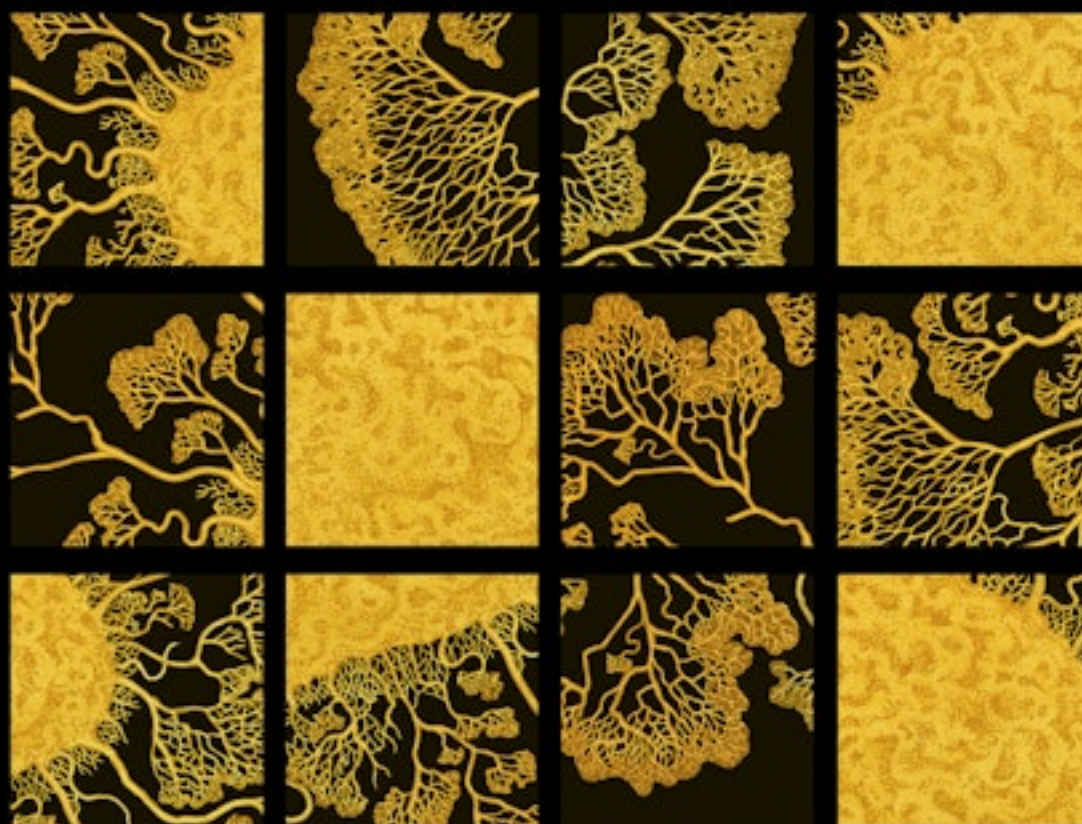


Dark honey fungus

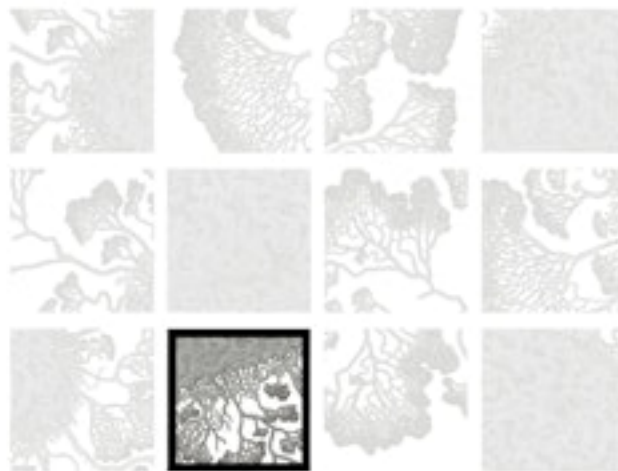
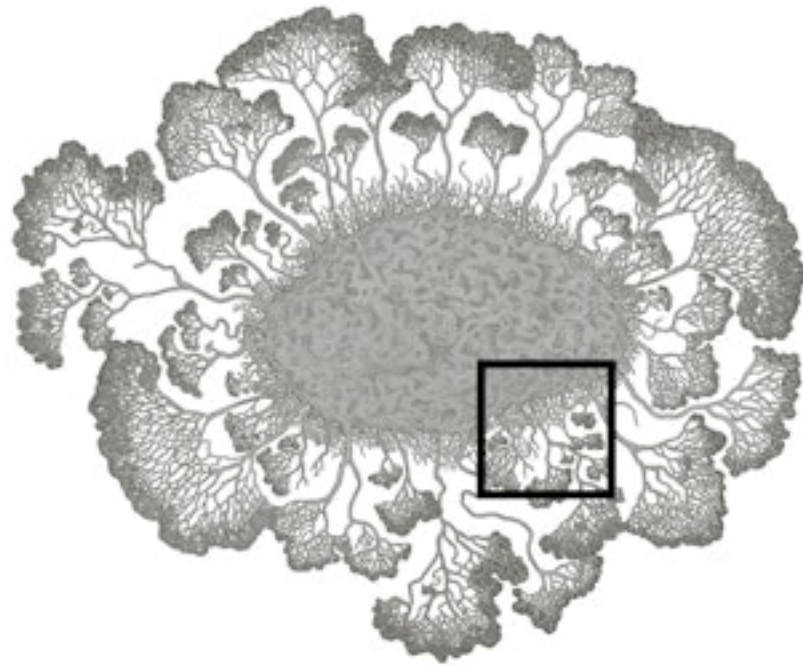
Armillaria ostoyae

Fungi that attack plants are known as fungal plant pathogens. Some honey fungi are major pathogens of trees and shrubs, forming black strands (rhizomorphs) which spread through the soil and split the bark from the wood.

Find the missing square



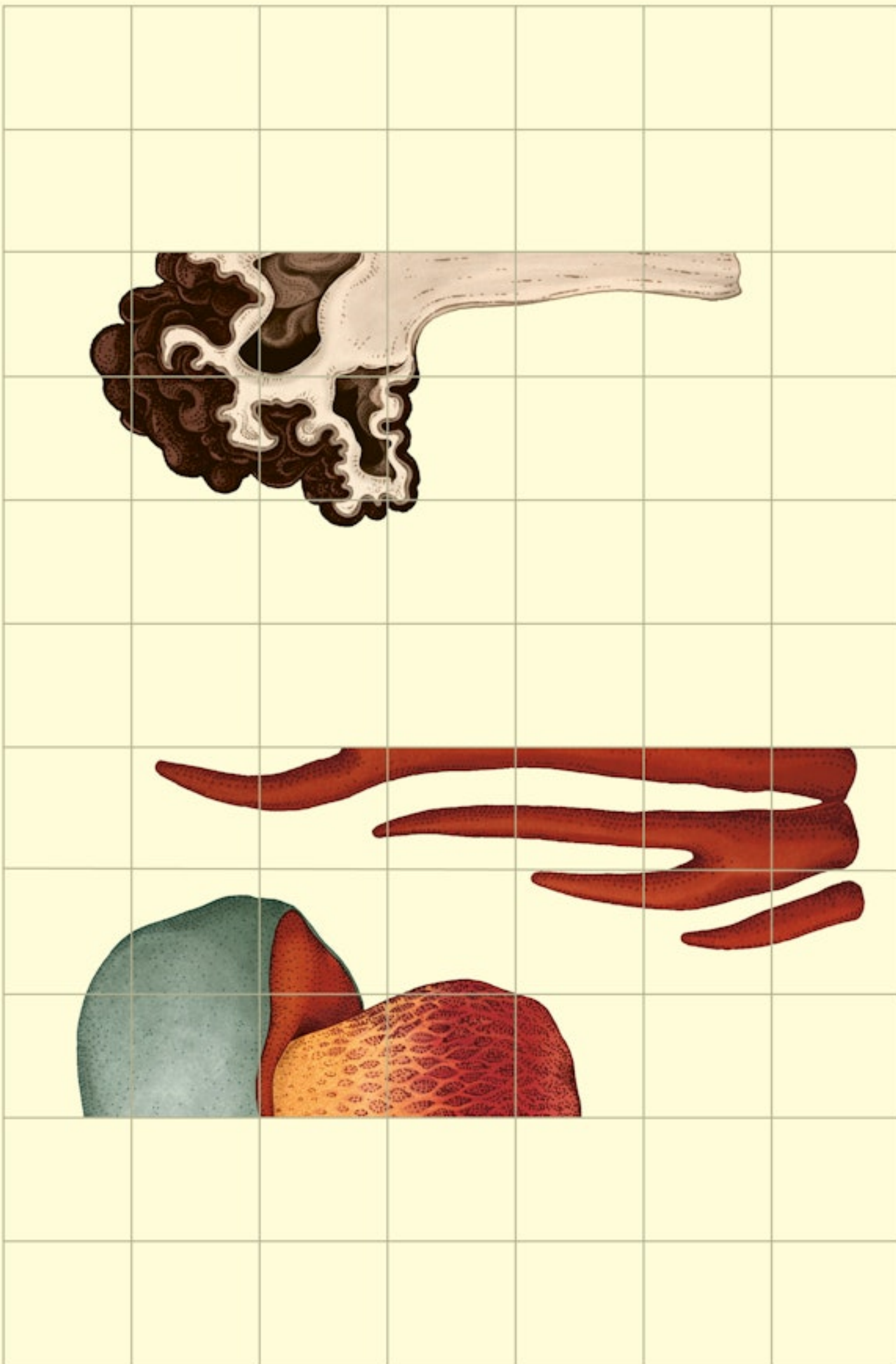
Answer



Slime moulds

Slime moulds, like this *Physarum polycephalum*, do not share a common ancestor and belong mostly to a group called 'Amoebozoa.'

Finish these poisonous fungi





False morel

Gyromitra esculenta

The toxic false morel is named for its close resemblance to the edible true morel.



Kaentake

Trichoderma comu-damae

This fatal species is found in parts of Asia and is considered one of the most toxic fungi in the world.



Satan's bollete

Rubroboletus satanas

So-called for its vibrant red stem and toxic nature, even consuming very small quantities of this fungus can lead to vomiting or dehydration.

Match these fungi and lichens
to their names



Ant mushroom



Pin lichen



Caterpillar fungus

Common puffball

Golden-eye lichen



Answers



Ant mushroom

Leucoagaricus gongylophorus

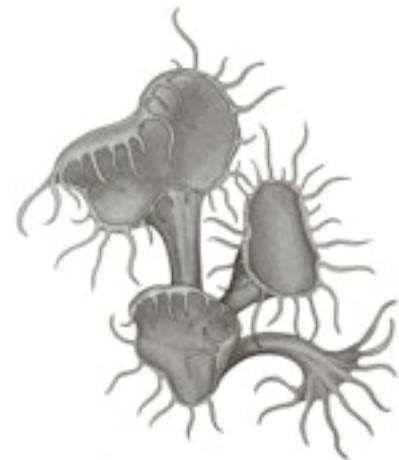
Mushrooms from the ant fungus are a rare sight. The ants do not like the mushrooms and try to remove them when they grow.



Caterpillar fungus

Cordyceps militaris

This fungus is found on caterpillars throughout the Northern Hemisphere.



Golden-eye lichen

Teloschistes chrysophthalmus

This shrubby lichen on twigs has bright orange apothecia (cup-shaped structures) surrounded by spiny projections (cilia).



Pin lichen

Calicium viride

This species produces its spores in a loose mass on top of a stalk, giving the appearance of dressmakers' pins.



Common puffball

Lycoperdon perlatum

The cream outer flesh of this fungus is covered with tiny bumps and spikes, and becomes brown when mature.

Finish the pattern and colour in
the cabbage lungwort



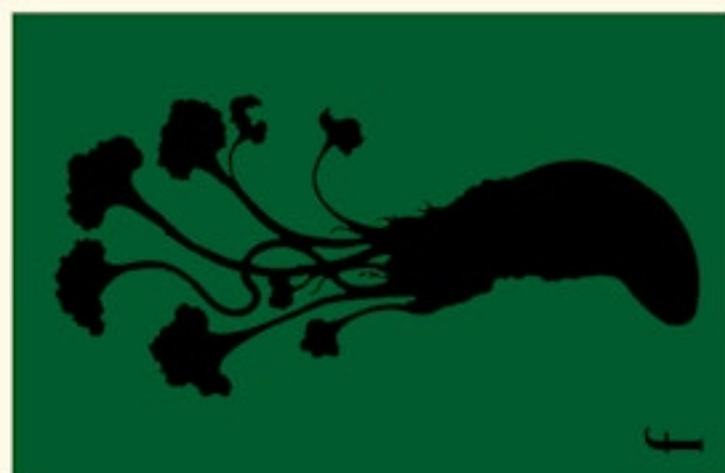
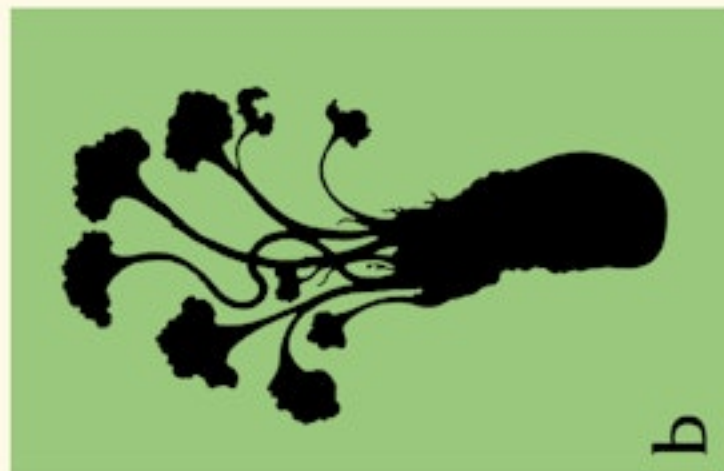
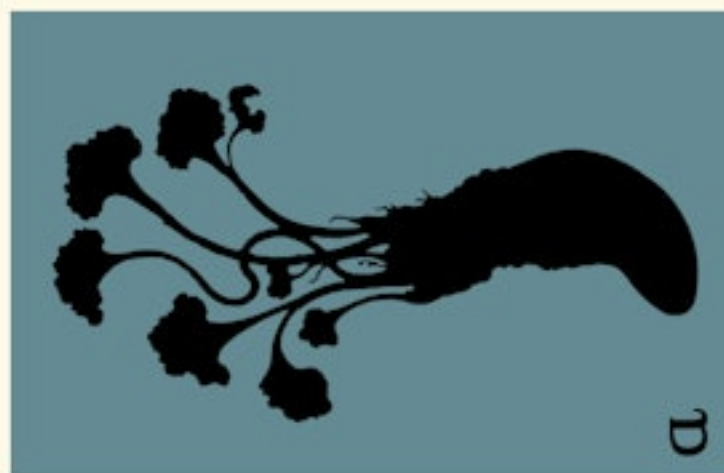
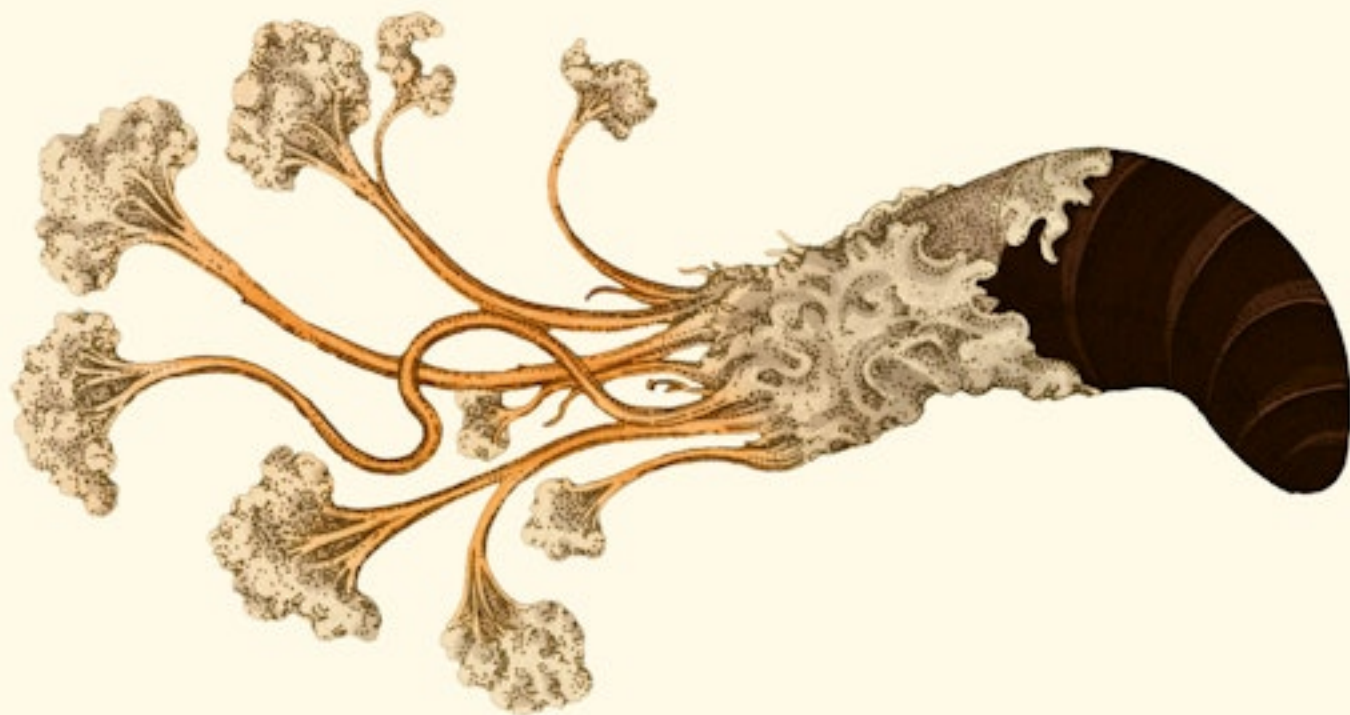


Cabbage lungwort

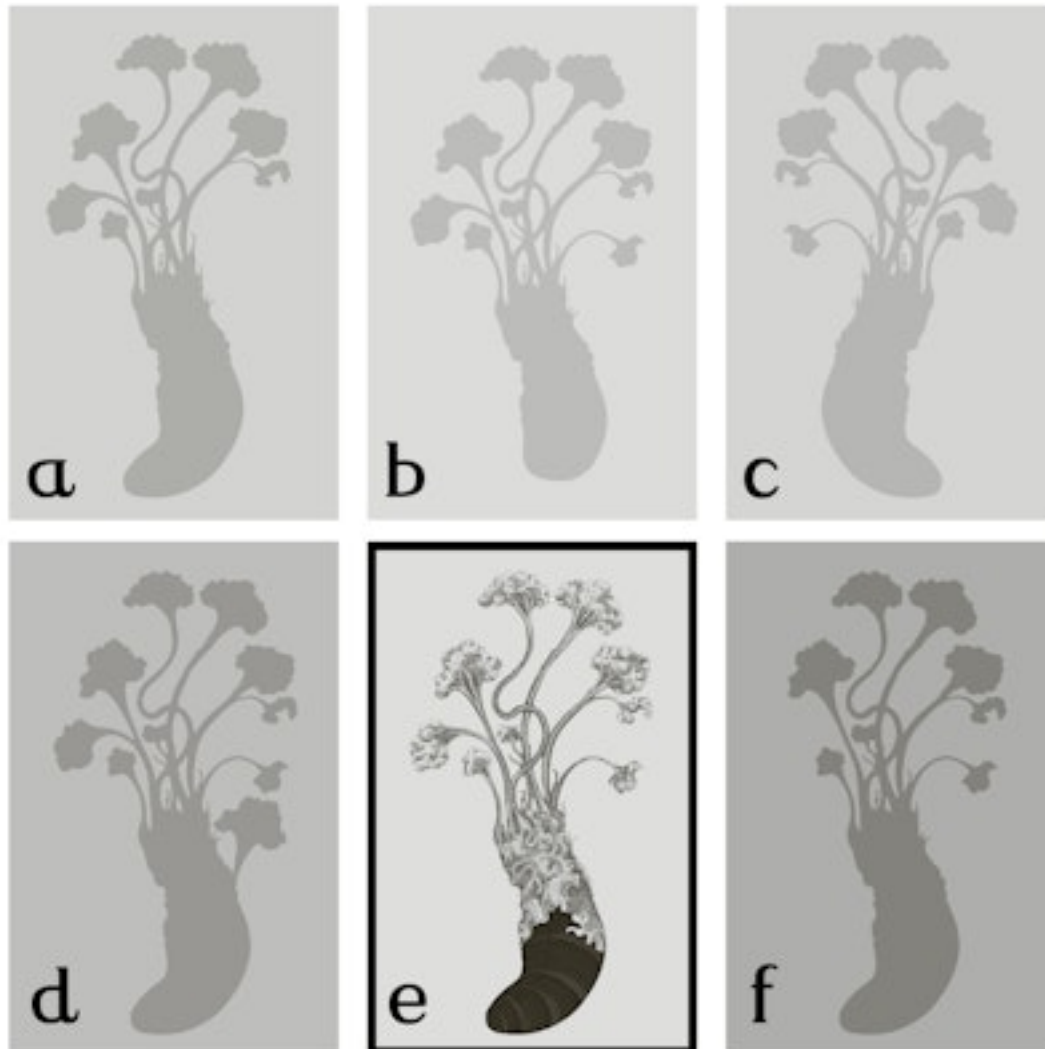
Lobaria linita

Several species of this lichen genus
are used in soups and as medicines.

Which silhouette matches this infected cicada nymph?



Answer



Infected cicada nymph

Isaria sinclairii

This fungus produces the immunosuppressant compound myriocin, which is thought to help the fungus evade its host's immune system. Myriocin inspired the creation of a synthetic derivative called fingolimod, which is a highly effective new treatment for the autoimmune disease multiple sclerosis.

Draw more fungi to fill the
ground of this forest





Temperate forests

With fertile soils, plenty of rain and seasonal weather, temperate forests make ideal homes for fungi. Here, fungi play an important role by decaying organic matter (saprotrophs), enhancing tree growth by forming symbiotic relationships with their roots (ectomycorrhizal fungi) or associating with algae and cyanobacteria to form lichens.

Colour in the spores





Spores

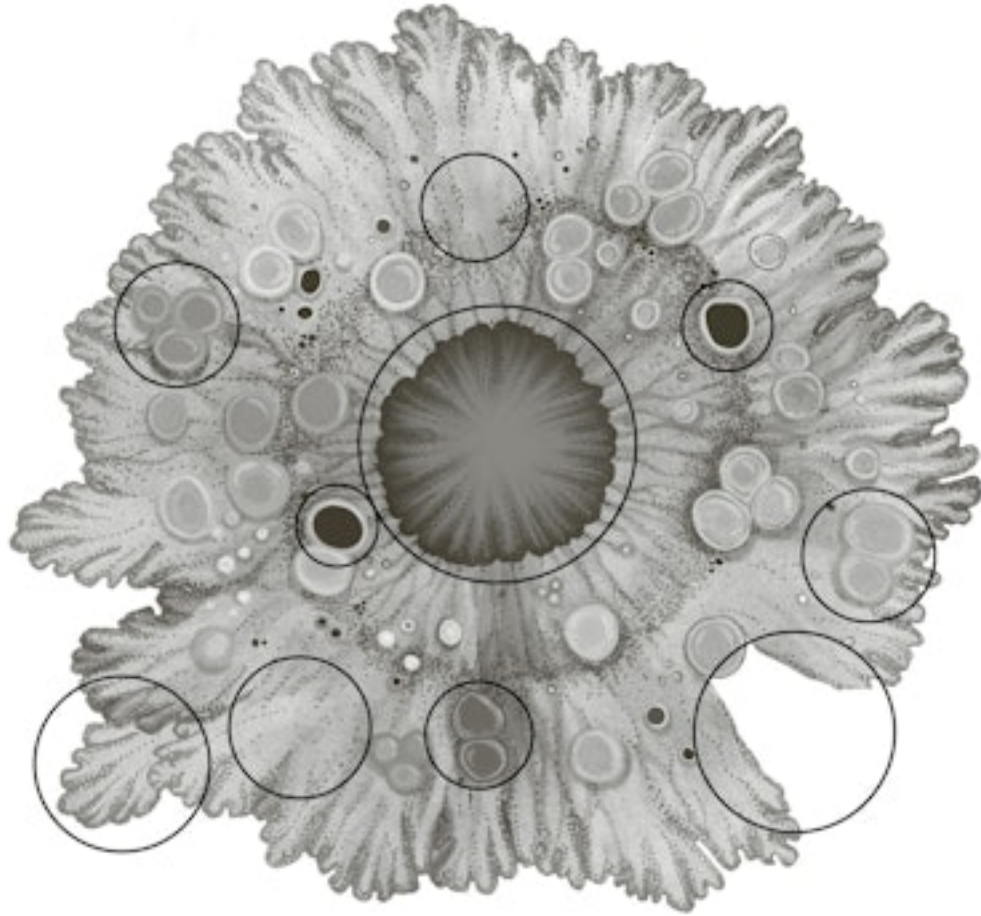
Spores are reproductive cells produced by fungi. The diversity of fungal spores is truly amazing. Colours vary from transparent to white, pink or various shades of brown to black.

Spot the difference

(there are 10 differences to spot)



Answers



Bullseye lichen

Placopsis gelida

An example of a three-partnered symbiosis, where a fungus associates with two photobionts (photosynthesising organisms): a green alga embedded in the thallus and a nitrogen-fixing cyanobacterium, found in separate structures called cephalodia (brown structure).

Find a way through the maze of mushrooms

Way
in

Finish

Answer

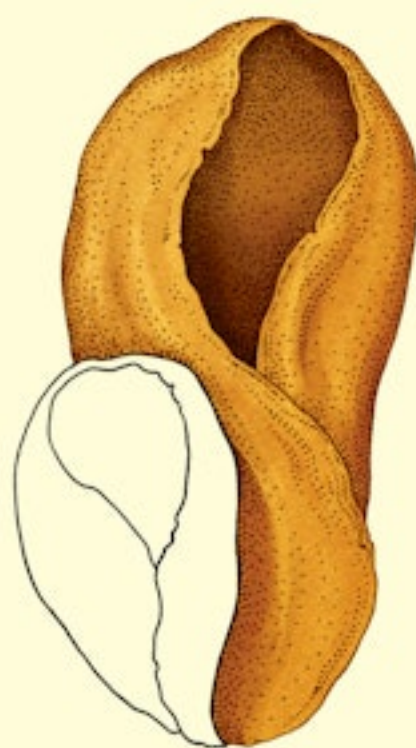
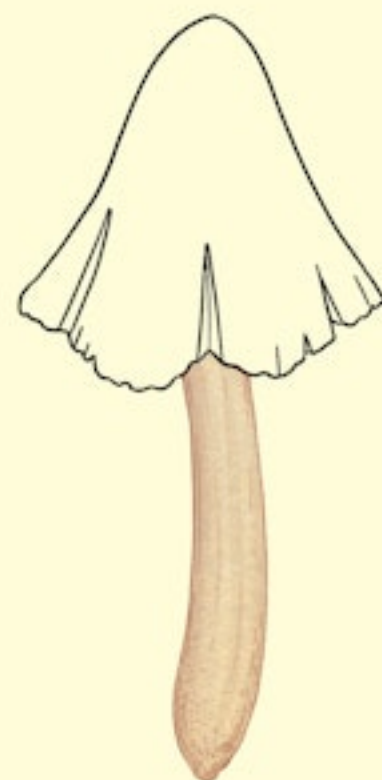


Mushrooms

When people think about fungi, they usually envisage mushrooms or toadstools. 'Mushroom' and 'toadstool' are not scientific terms but are used to describe sporing bodies with a similar appearance. They belong to many orders of fungi but usually have a cap, gills and a stipe (stem).

Fill the page with fungi

(they could be similar to these or completely new discoveries)





Hare's ear

Otidea anatica

Found in many parts of Europe and North America, this golden-coloured fungus commonly lines the pathways of well-trodden routes through temperate woodland.



Waxcaps

Hygrocybe spp.

Waxcaps are bright spots of colour, often seen on long-established grasslands and lawns. Some grassland waxcaps are especially rare.

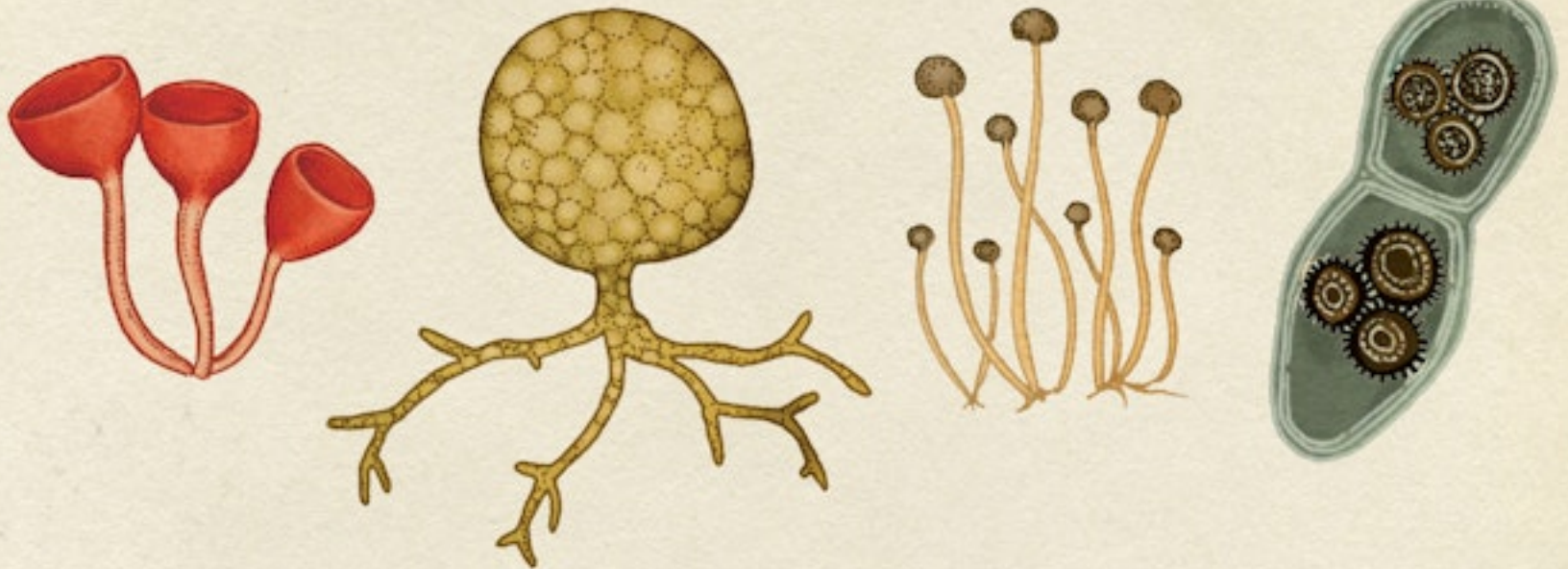


Shaggy scalycap

Pholiota squarrosa

A common parasitic fungus, this can be found growing in clusters at the base of stumps and trees. It is covered in scales, which makes it easy to recognise.

Match each fungus to the phylum
it belongs to



Cryptomycota

Microsporidia

Blastocladiomycota

Chytridiomycota

Zoopagomycota

Mucoromycota

Ascomycota

Basidiomycota



Answers



Cryptomycota



Microsporidia



Blastocladiomycota



Chytridiomycota



Zoopagomycota



Mucoromycota

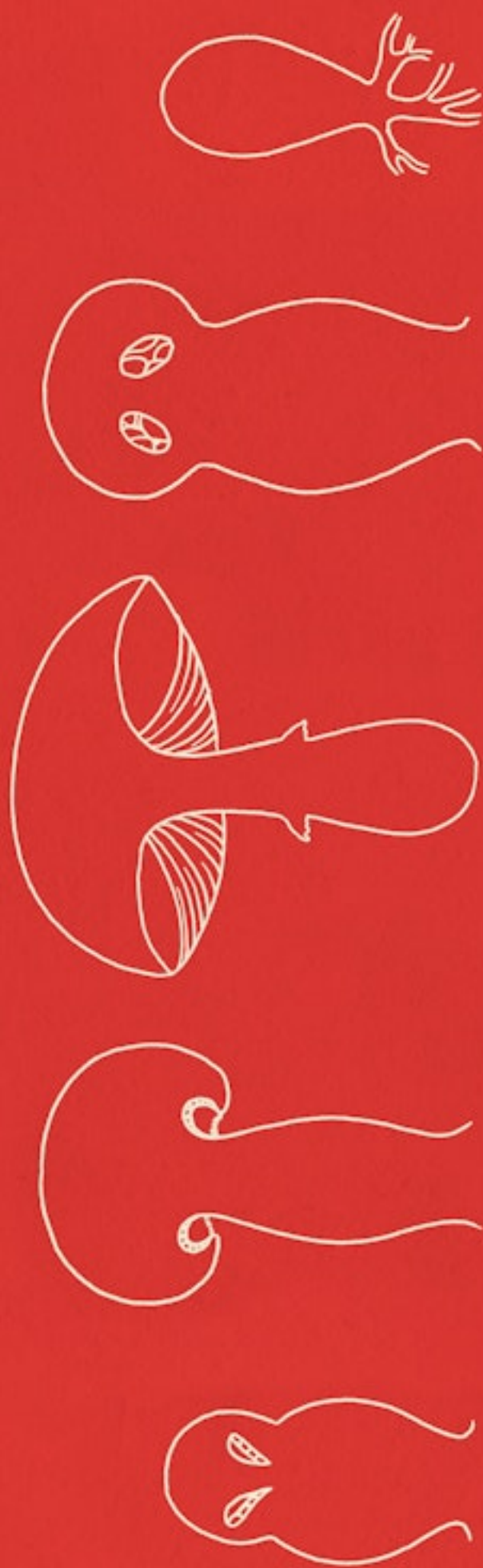


Ascomycota



Basidiomycota

Draw the development of the common field mushroom
in the correct order



1

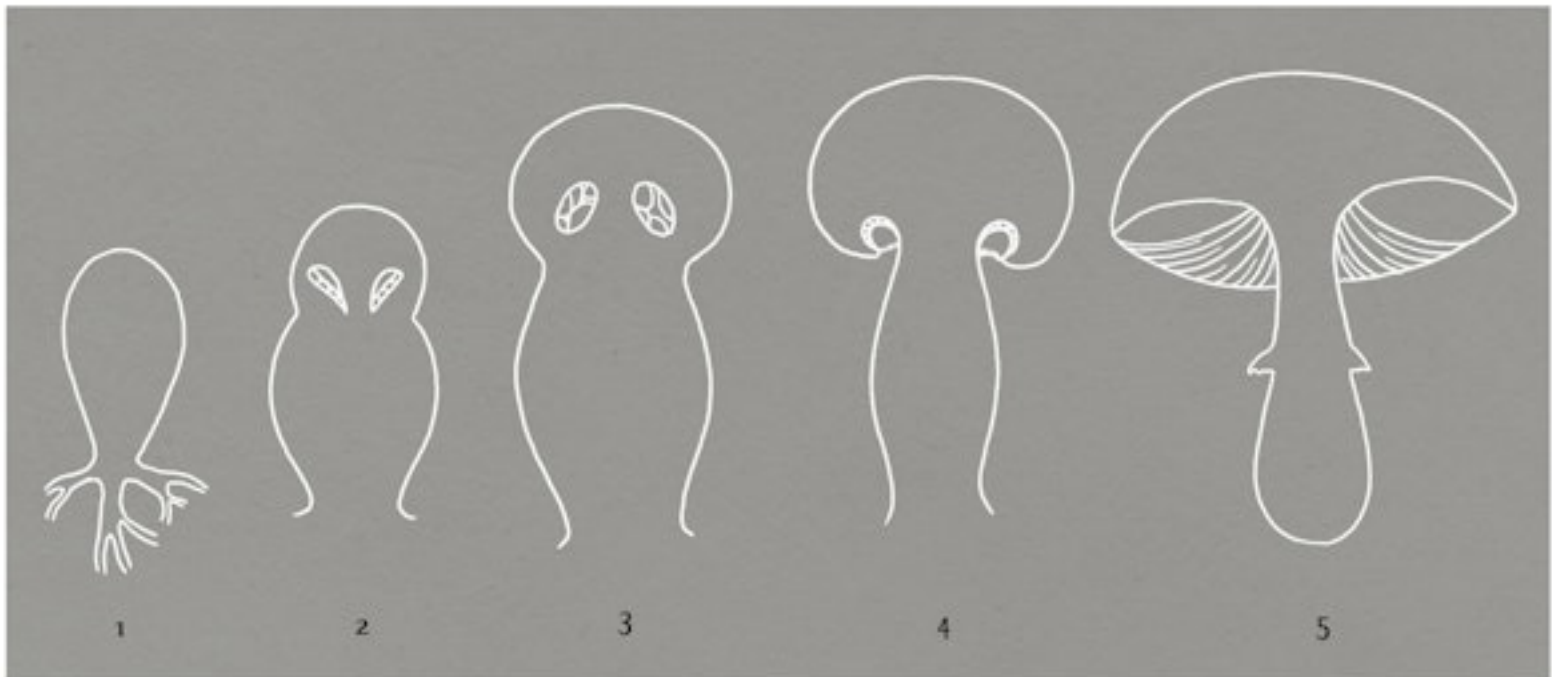
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Answers

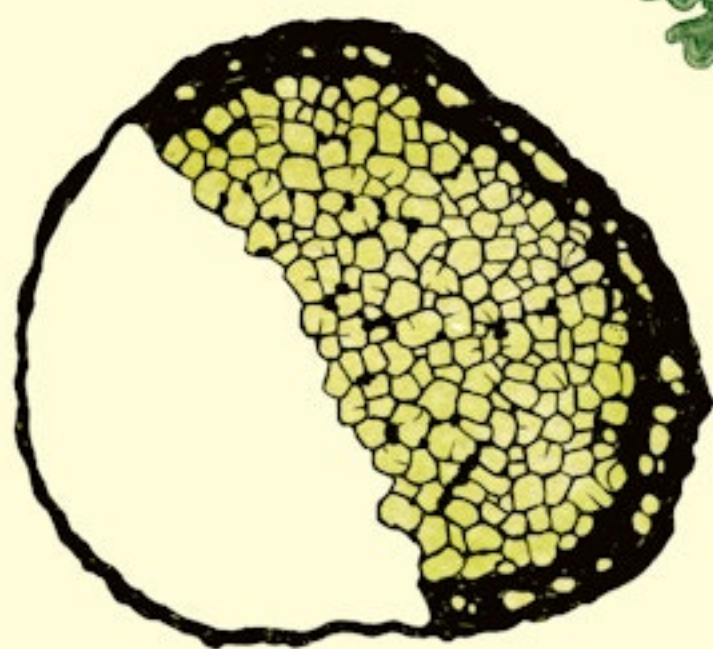


Common field mushroom

Agaricus campestris

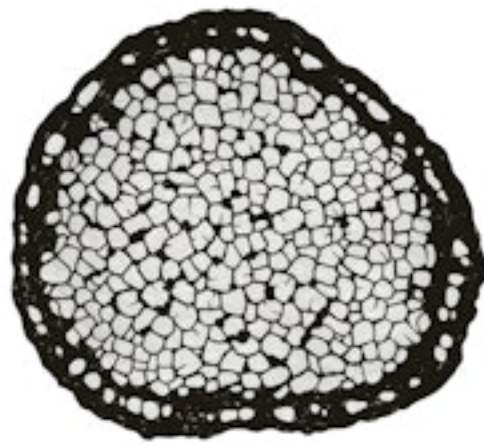
Development of a mushroom, one of many forms that sporing bodies in the phylum Basidiomycota can take. Once the cap opens, the veil breaks and the exposed gills release spores.

Finish the patterns and colour
in the lichens





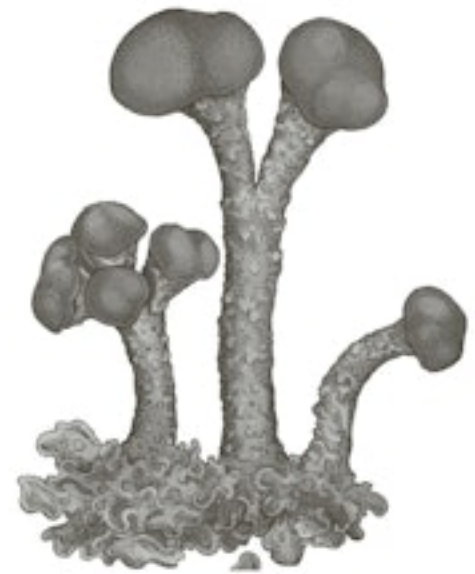
Cora pavonia



Map lichen

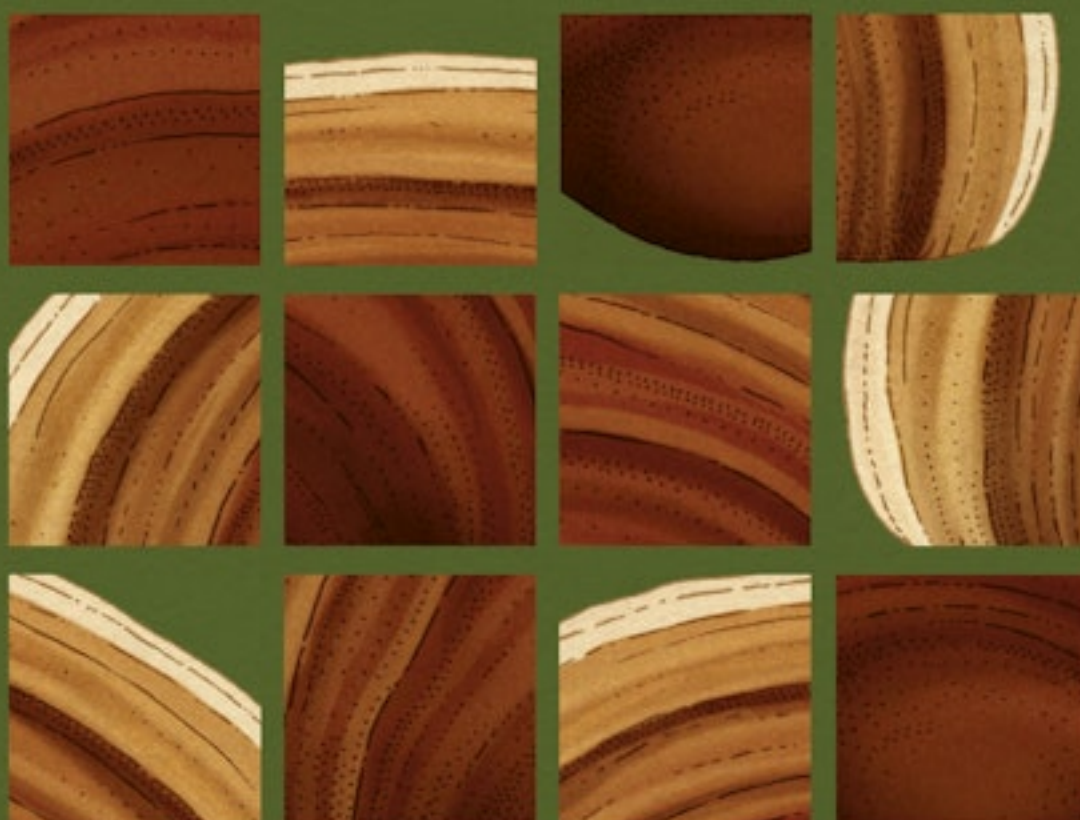
Lichens

Lichens come in a huge array of shapes and colours. They can be crusty, leafy or shrub- or hair-like, and grow on almost any surface they can find. Lichens are found nearly everywhere on Earth – in water, in deserts and from the poles to the tropics.

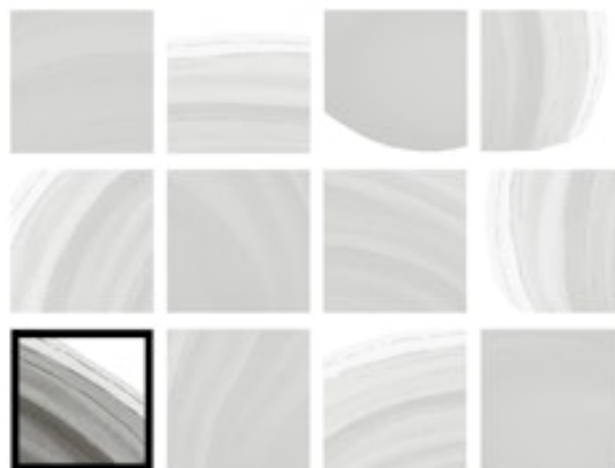
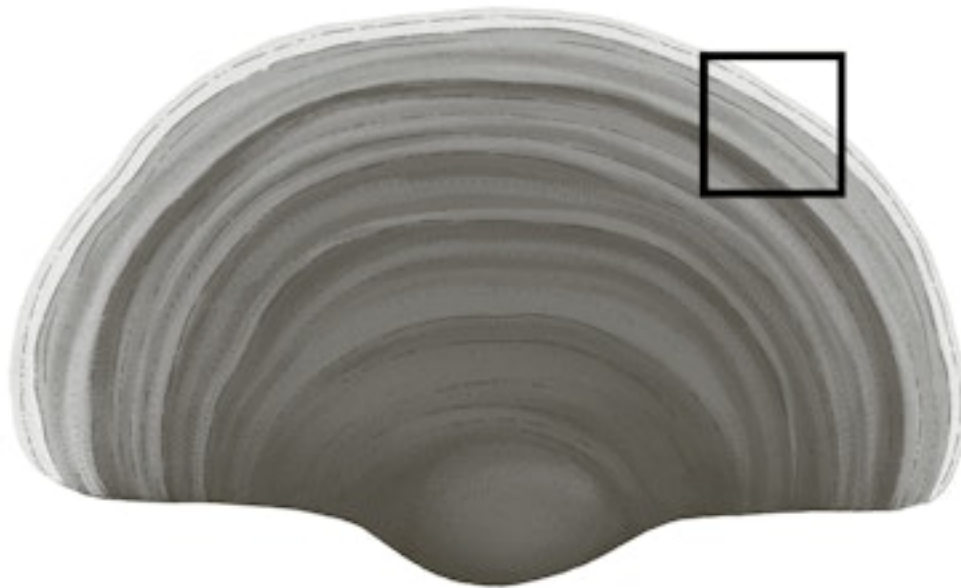


British soldiers' lichen

Find the missing square



Answer

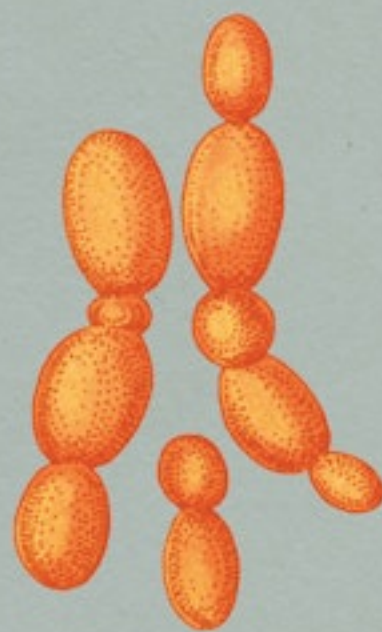


Basal stem rot

Ganoderma orbiforme

This fungus causes basal stem rot in oil palm plantations in Southeast Asia. The fungus produces woody brackets on the side of the infected tree.

Circle the poisonous fungi



Answers



Chanterelle



Satan's bolete



Ergot fungus seen on rye



Button mushroom

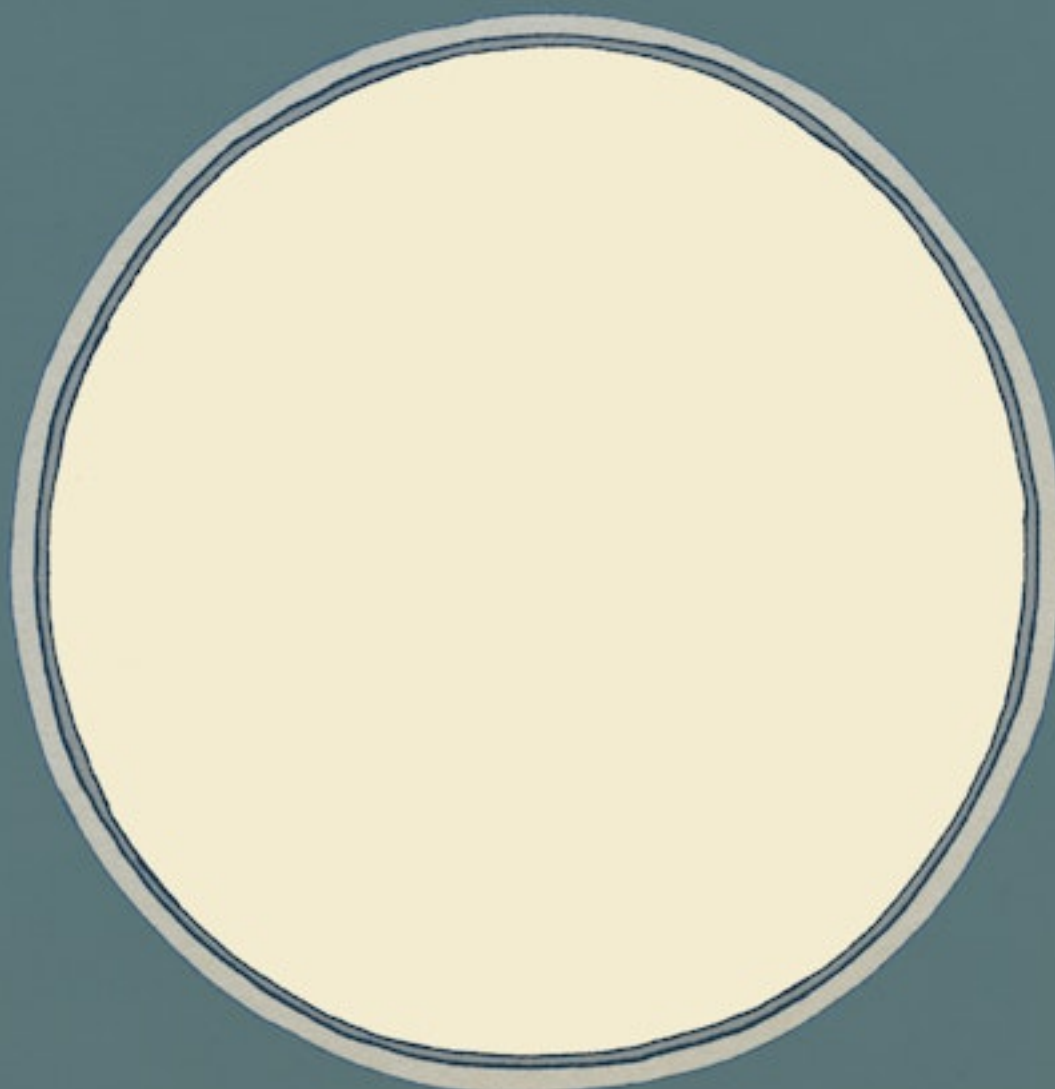


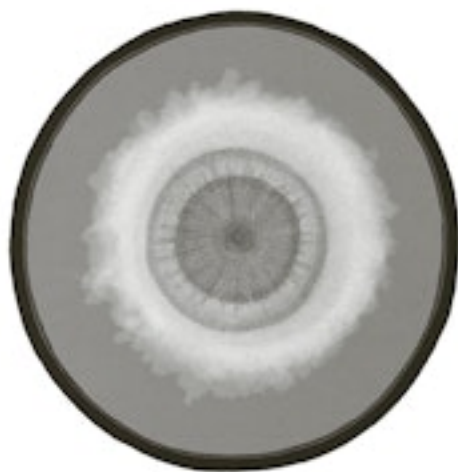
Destroying angel



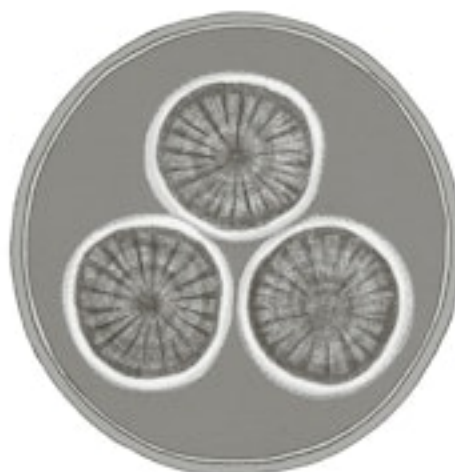
Baker's yeast

Draw a new fungus on the culture plate -
it can be as colourful as you like





Aspergillus terreus



Penicillium rubens



Glarea lozoyensis

Wonder drugs

Fungi are the source of some of the most important drugs ever discovered. Some fungi have redefined what's possible with medicine, most famously penicillin.

Spot the difference

(there are 10 differences to spot)



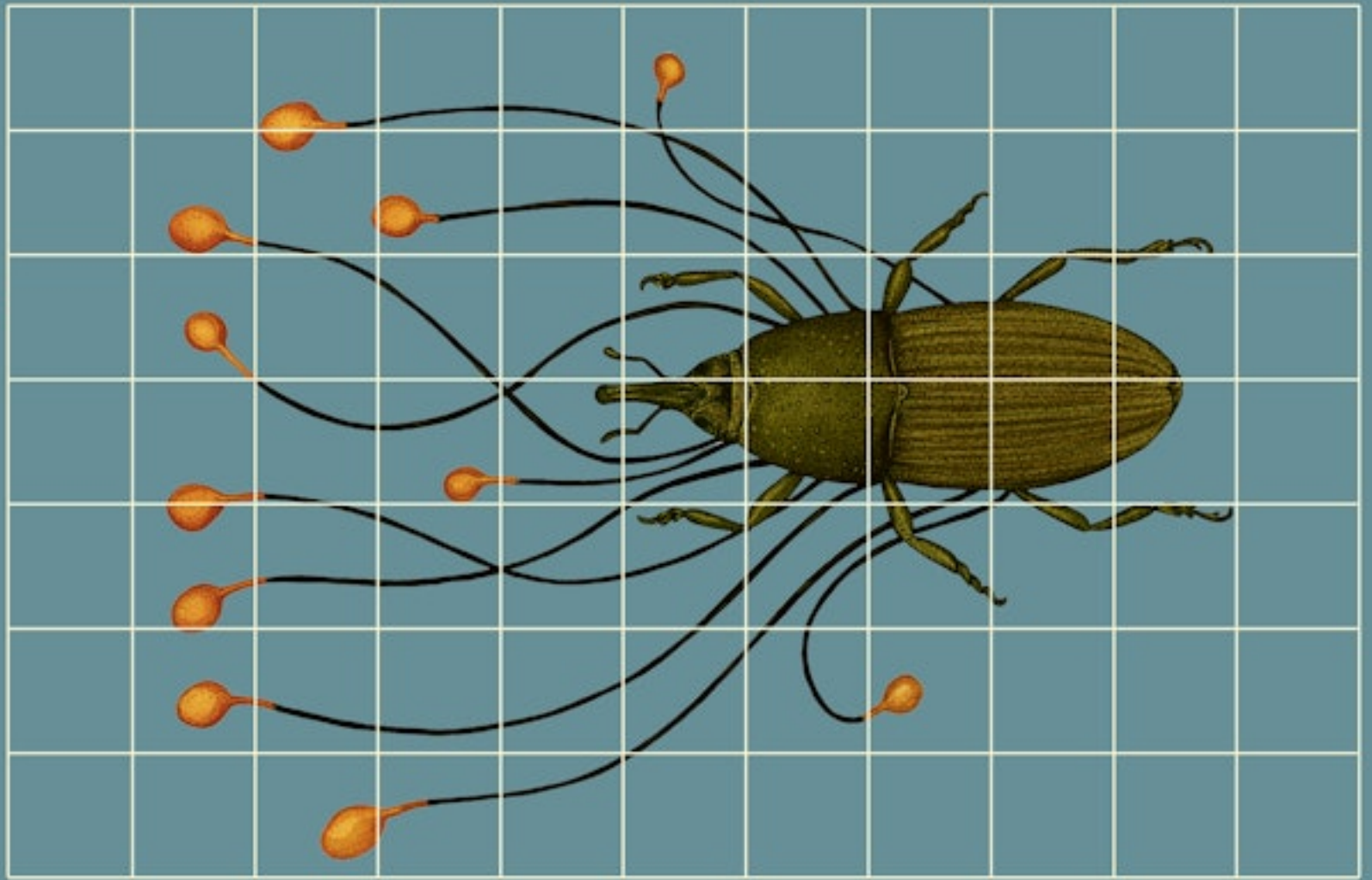
Answers



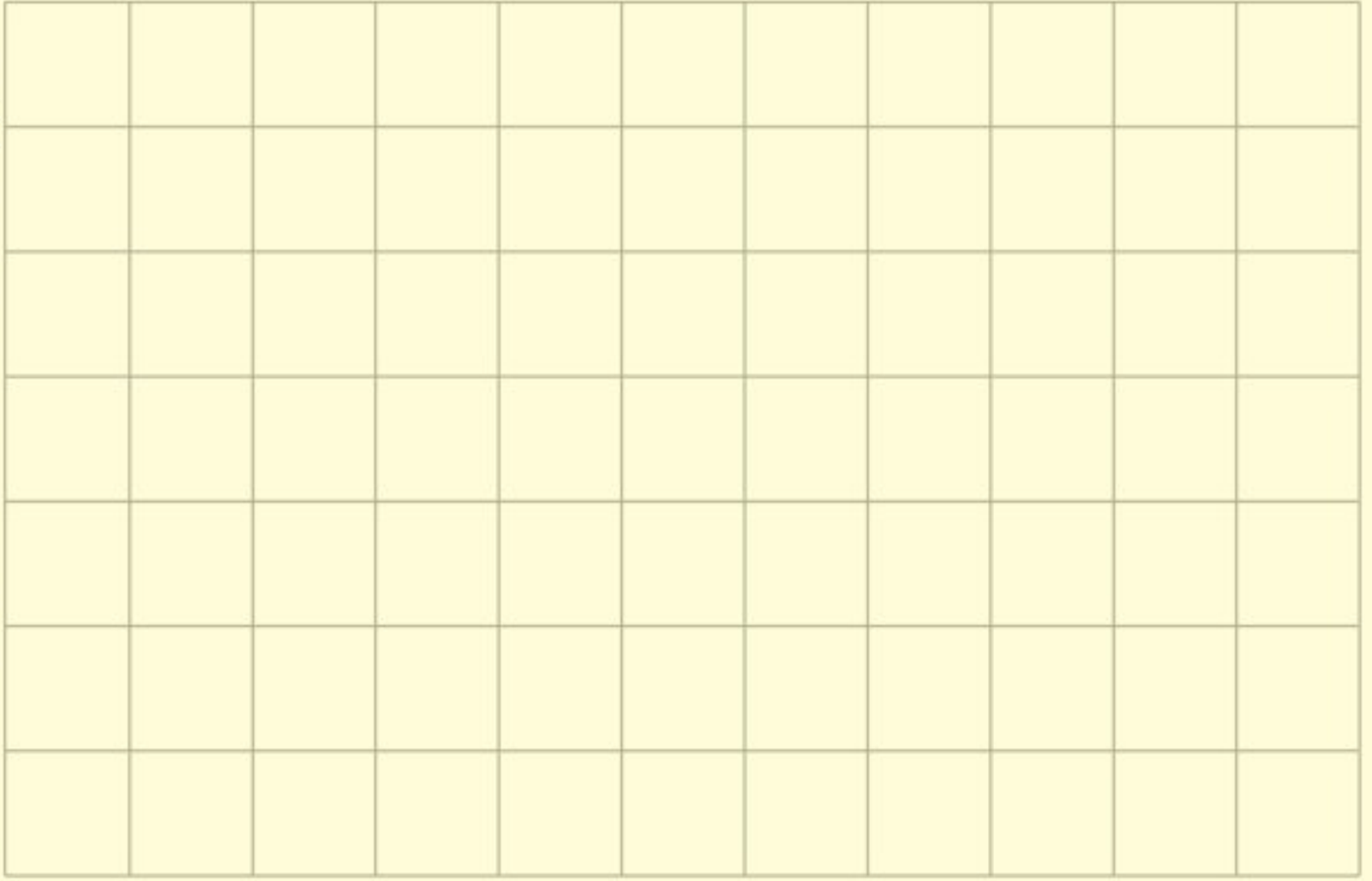
Mountains

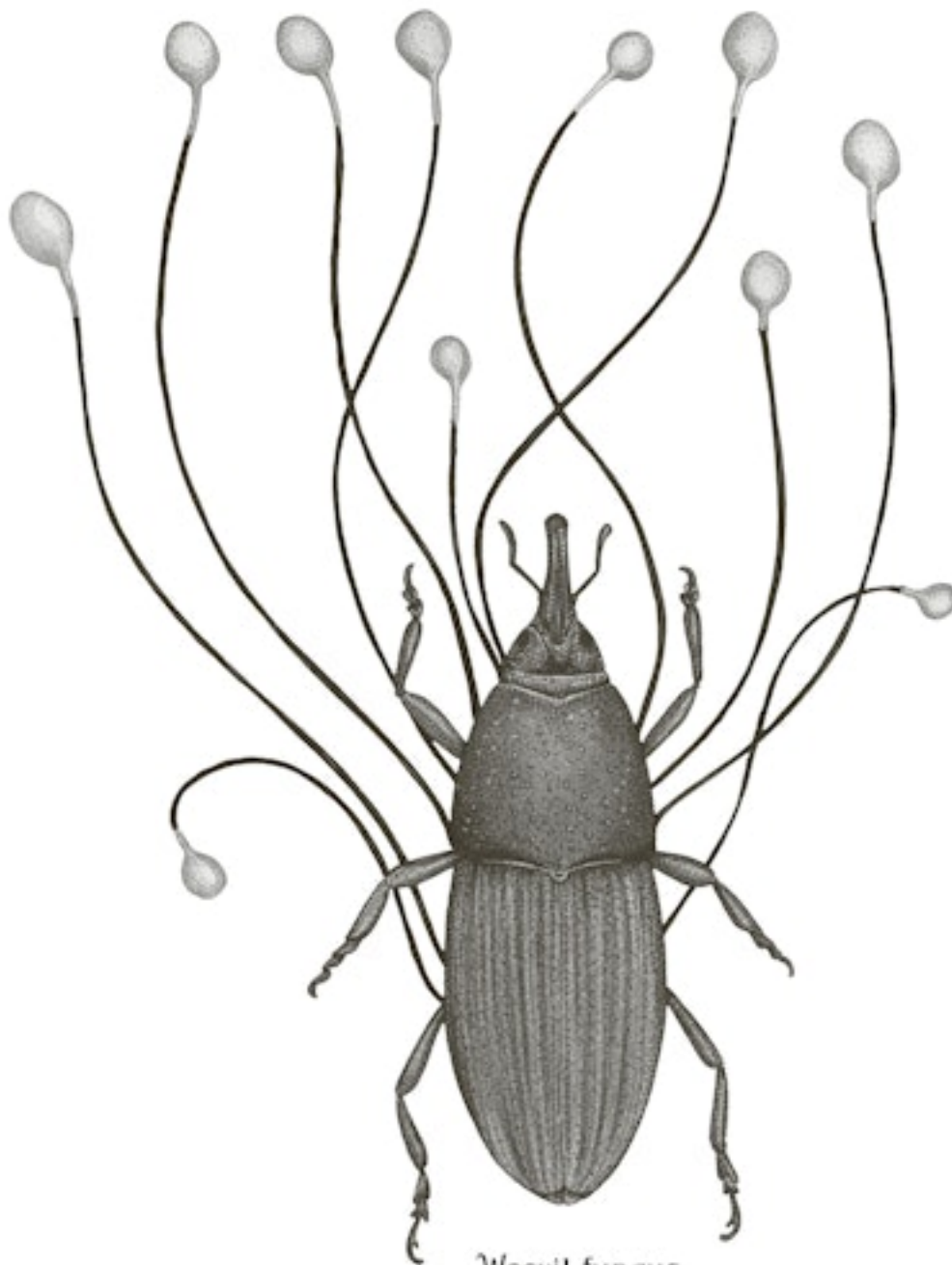
Mountains provide a diverse range of environments in which many different fungi occur; some of them cannot be found anywhere else in the world. The fungi here need to adapt to the severe conditions that become harsher with increasing elevation.

Weevil fungus



Draw the weevil fungus





Weevil fungus

Ophiocordyceps curculionum

This fungus infects weevils (*Curculionidae*), from which it gets its species name. To date, these fungi have only been found in the tropical regions in South and Central America.

Match these fungi to their names



Violet
webcap



Shaggy ink
cap

Termite
mushroom

Saffron
milkcap



Green elf
cup



Answers



Termite mushroom

Termitomyces striatus

These mushrooms grow from the fungus that termites cultivate.



Saffron milkcap

Lactarius deliciosus

This fungus forms in the roots of pine, forming ectomycorrhizas. The orange mushroom is edible.



Shaggy ink cap

Coprinus comatus

This species grows in groups. It has a beautiful, white, scaly cap and gills which secrete a black 'ink' when maturing.



Green elf cup

Chlorocibaria aeruginosa

This species produces a vivid blue-green pigment which can be used to stain wood.



Violet webcap

Cortinarius violaceus

This beautiful, big, violet mushroom can be found in Europe and North America.

Colour in the witches' broom disease
and draw more fungi growing on the
cocoa pod





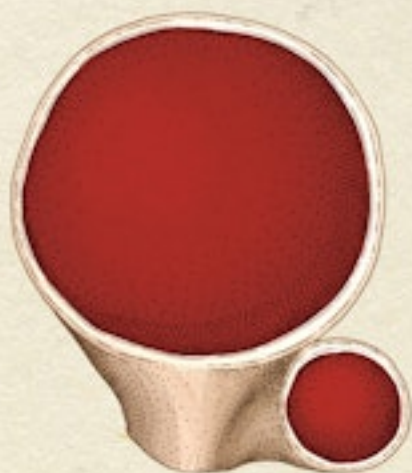
'Witches' broom disease

Moniliophthora perniciosa

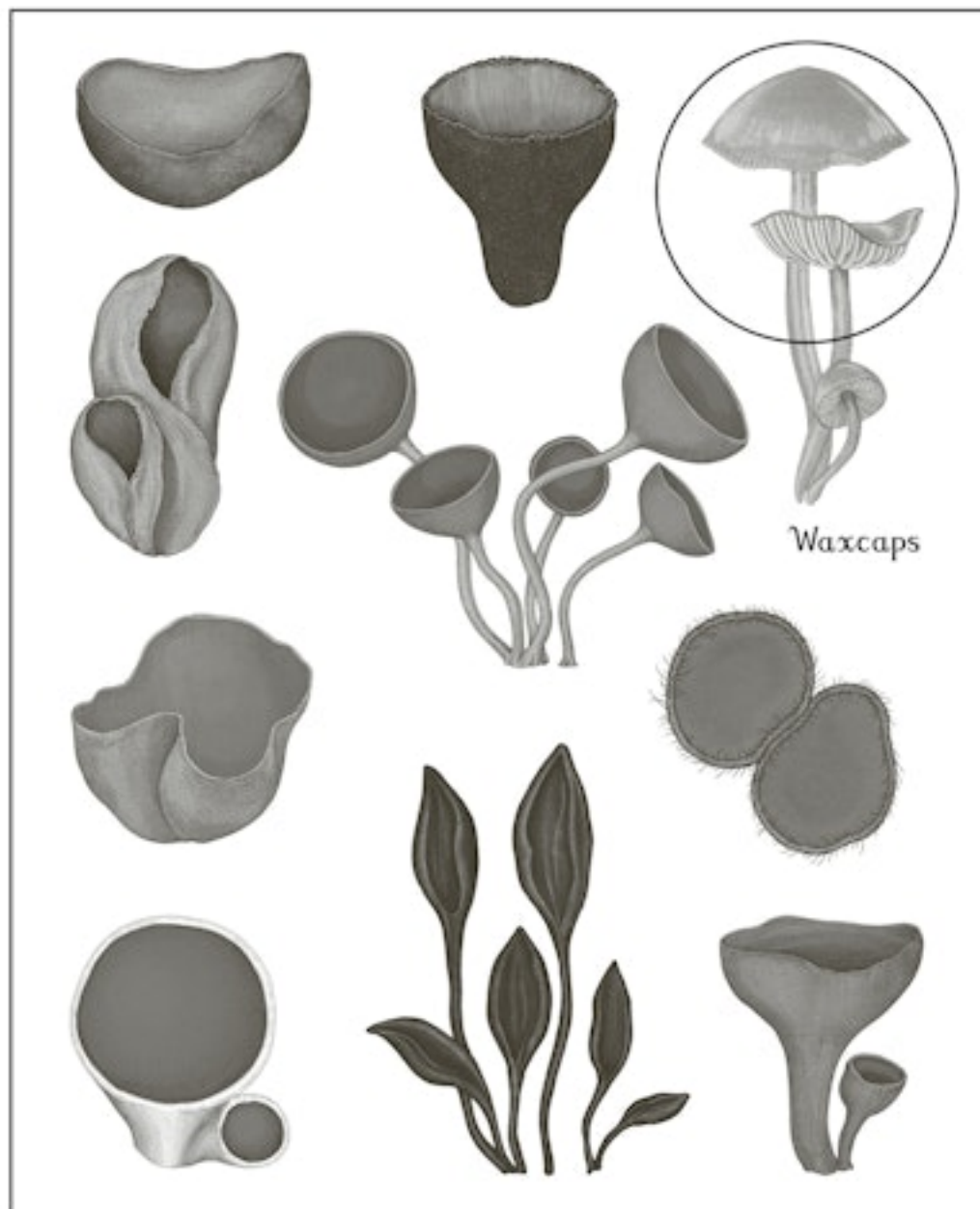
This fungal plant pathogen infects cocoa trees, causing reduction in yield of up to 90 per cent. It is also resistant to fungicides.

Circle the odd one out

(all but one are cup fungi)



Answer



Cup fungi

Most cup fungi are spore shooters. The inside of the cup is lined with spore-bearing tissue and when the cup is mature and the weather conditions are just right, spores are shot out at high speed in a synchronised puff.

How to draw Caesar's mushroom



1



2

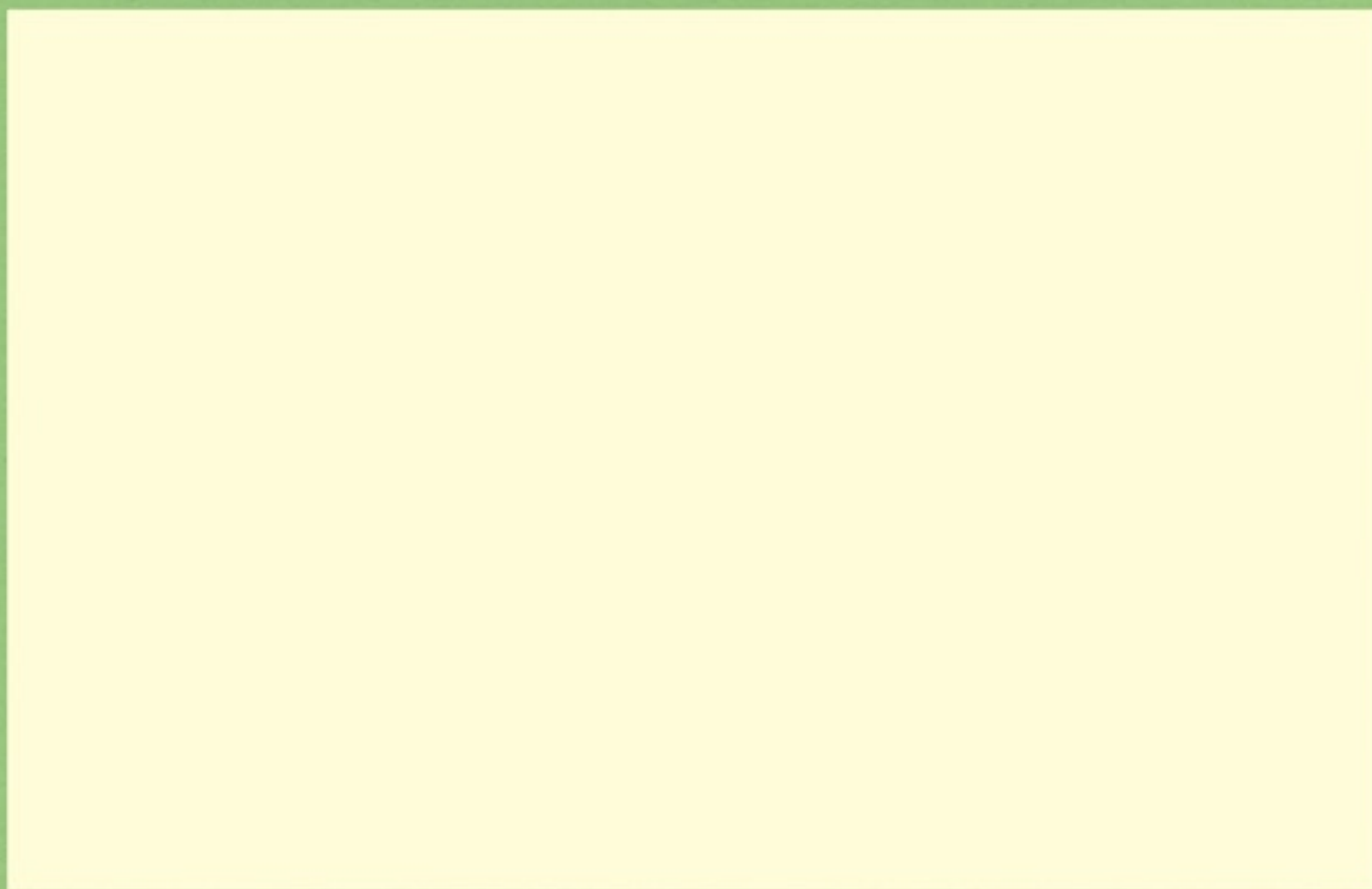


3



4

Try it yourself





Caesar's mushroom

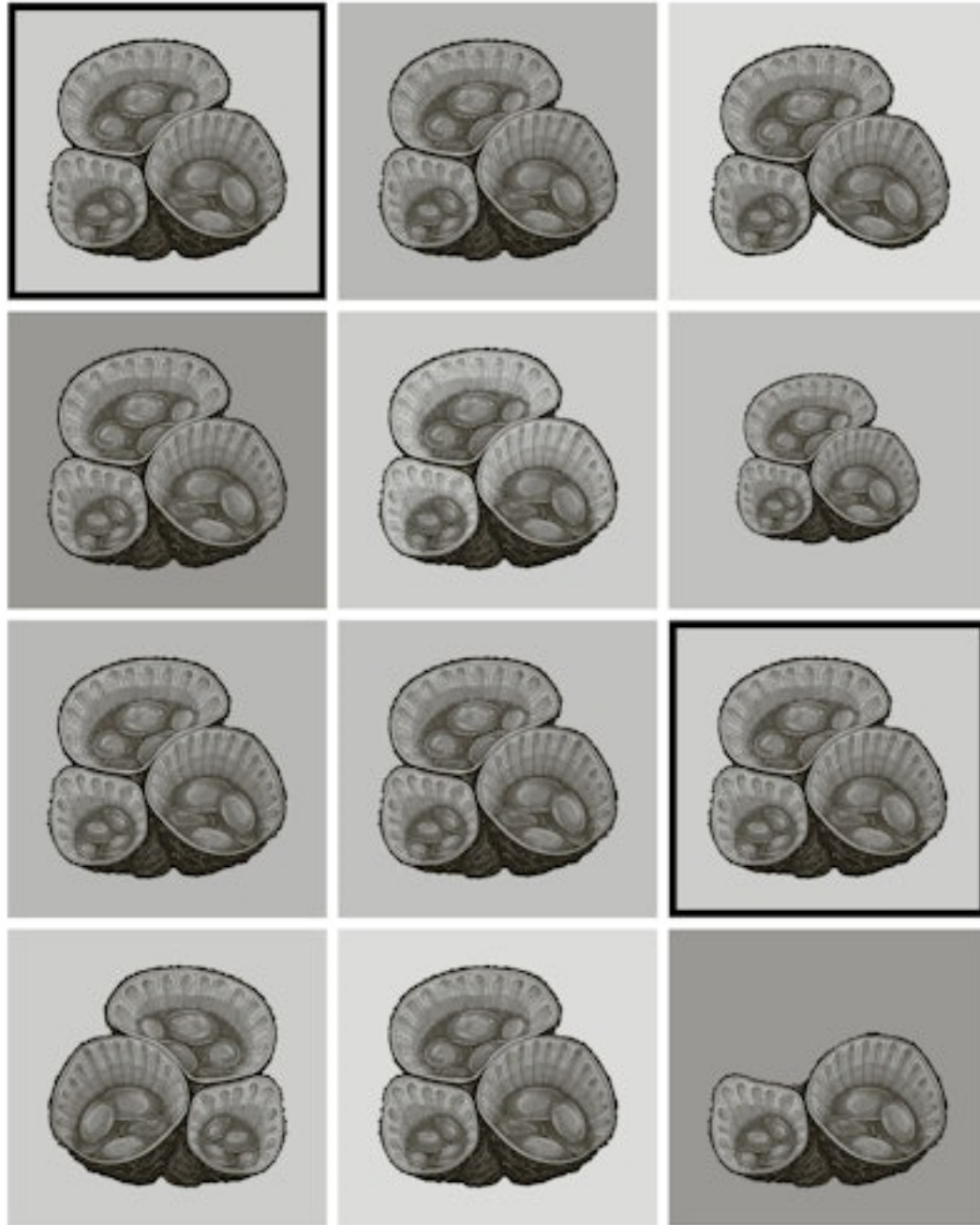
Amanita caesarea

Caesar's mushroom grows in southern Europe and North Africa. This fungus is found in the phylum Basidiomycota.

Find the matching pair of
bird's nest fungi



Answer



Bird's nest fungus

Cyathus striatus

This widespread fungus can often be found growing on mulch and compost in gardens and holds the spores in pellet-like sacs (peridioles).

Draw the stinkhorn emerging from
its egg in the correct order



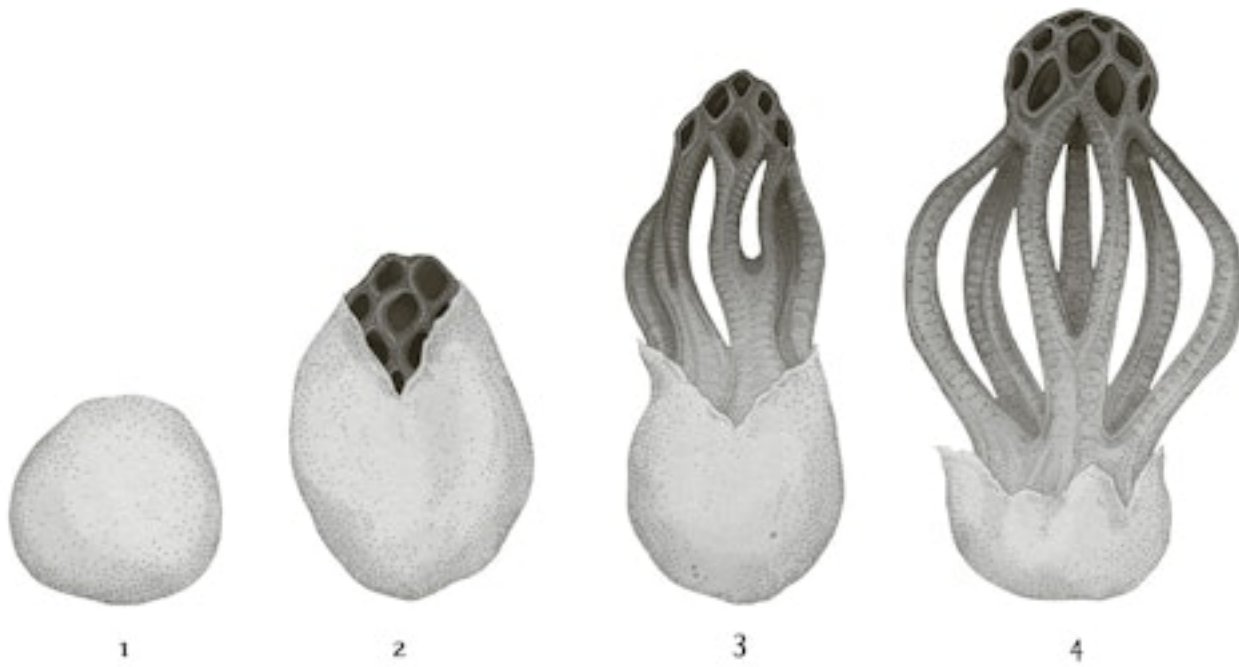
1

2

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4

Answer



Stinkhorn fungus

Colus hirudinosus

The cage-like structure of this fungus intensifies from a light orange at the base to a dark red at the tip and emerges from a gelatinous white 'egg'. Despite its beauty, it has an odour similar to faeces.

Draw in the other half of these pictures





Trichoderma viride

Seen on a culture plate displaying typical radial growth. Some fast-growing species of this genus can be cultivated to combat the spread of fungal pathogens in various plants including cotton, tobacco and sugar cane.



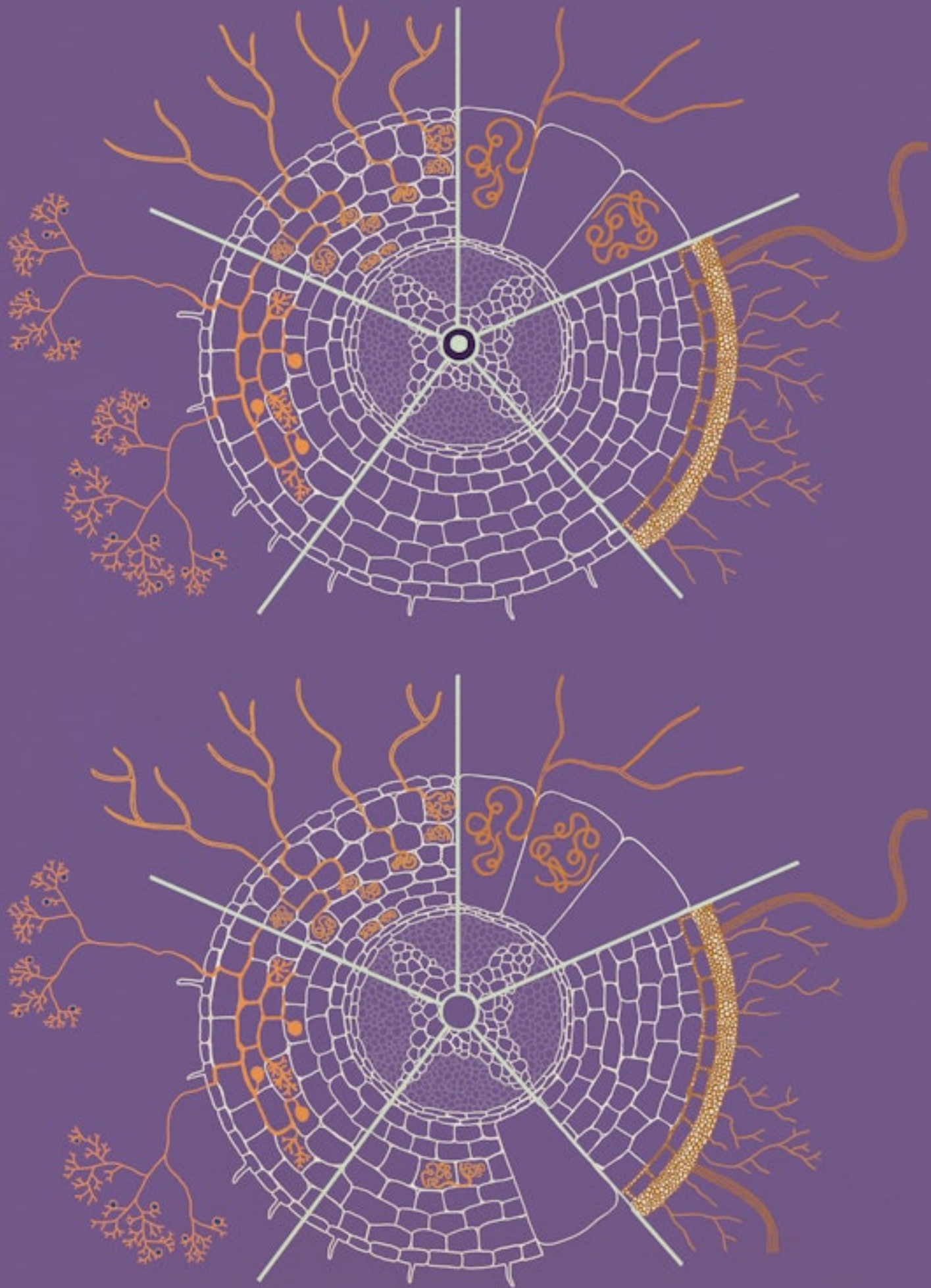
Blue mould rot fungus on apple

Penicillium expansum

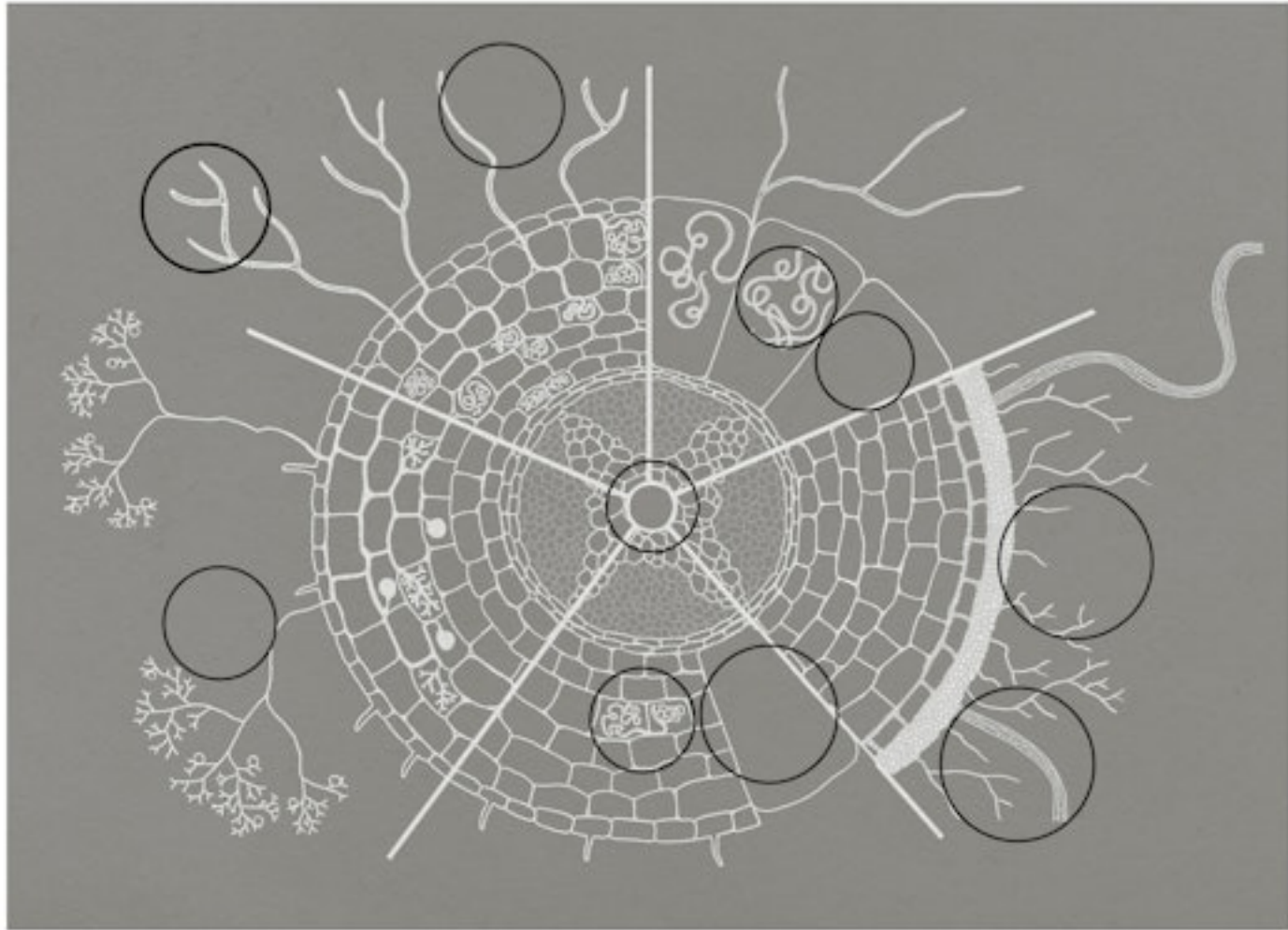
When growing on a nutrient-rich surface like an apple, the hyphae of this fungi branch repeatedly in a radial manner, forming circular patches.

Spot the difference

(there are 10 differences to spot)



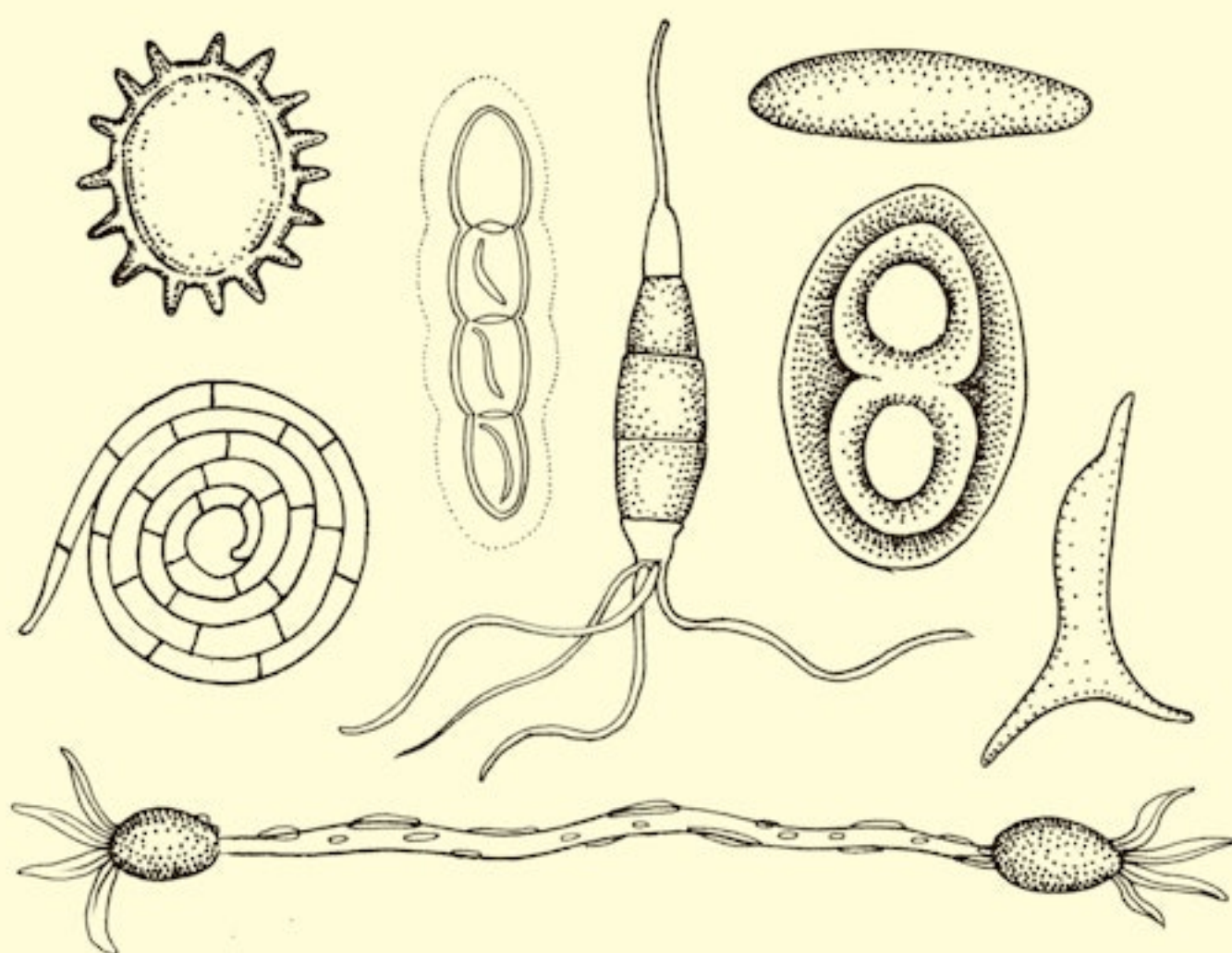
Answers

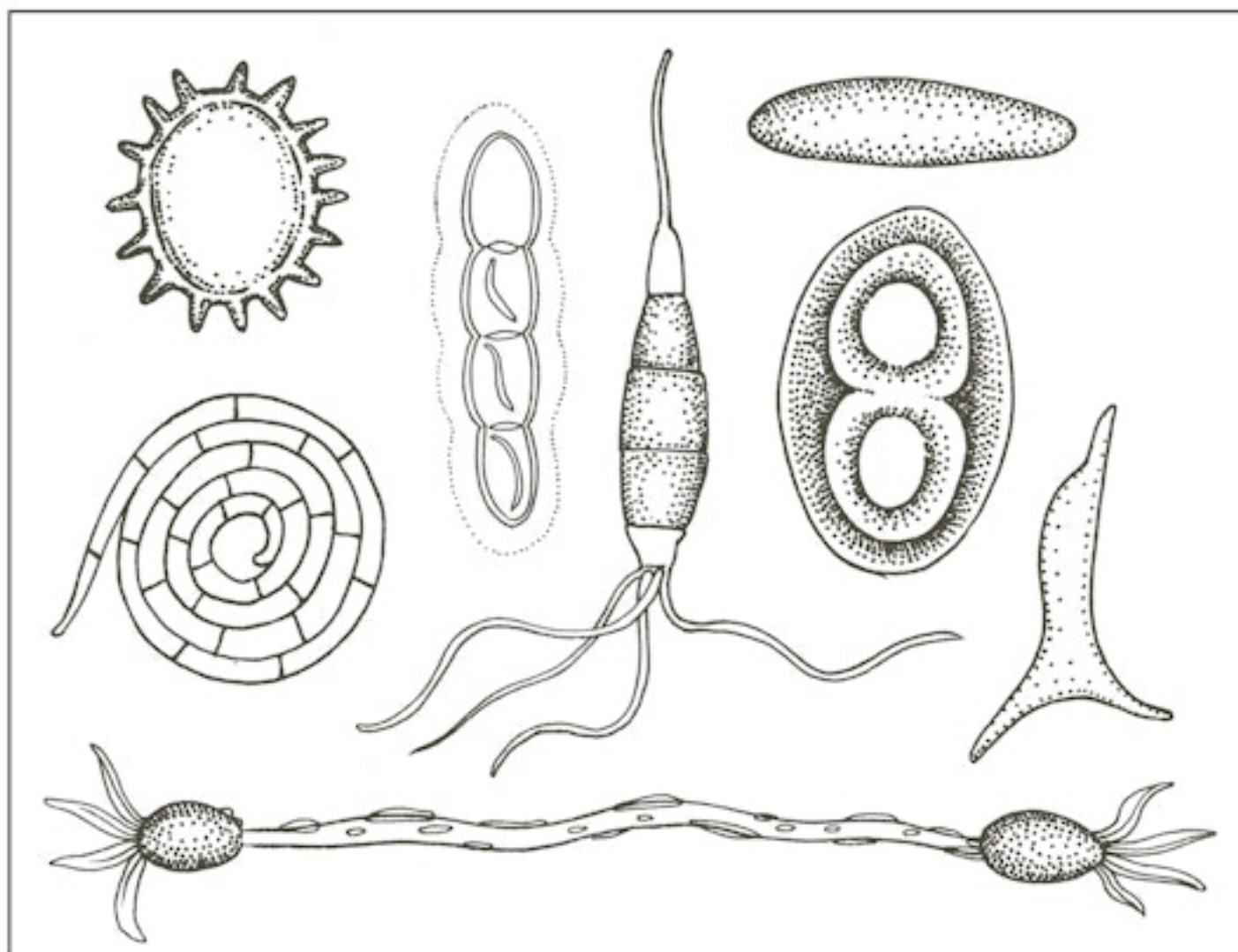


Cross section of a root showing the four main types of mycorrhiza

Different fungi associate with different plants forming four main types of mycorrhizas: arbuscular mycorrhizas; ectomycorrhizas; ericoid mycorrhizas; and orchid mycorrhizas.

Create your own fungal spores

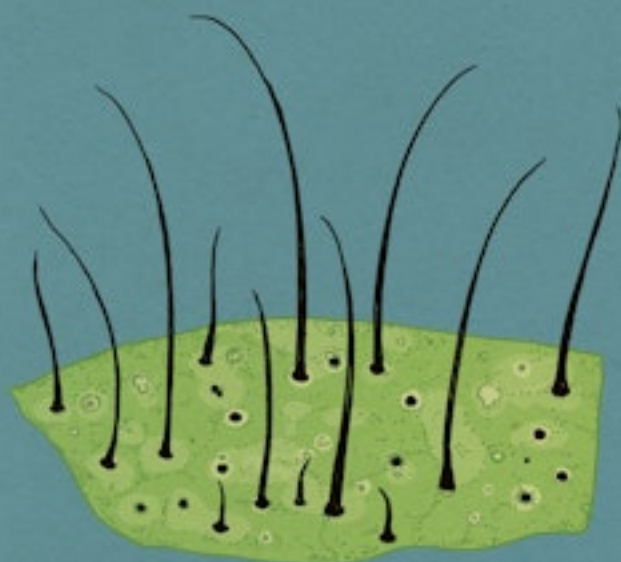
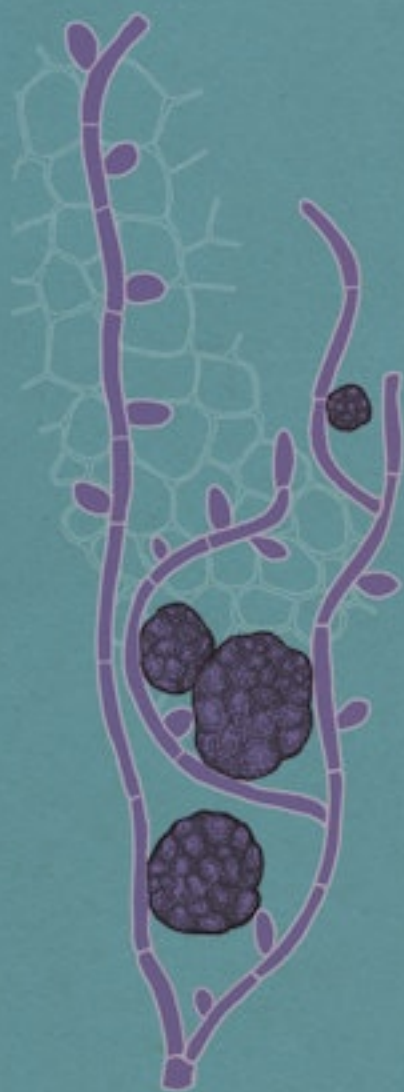
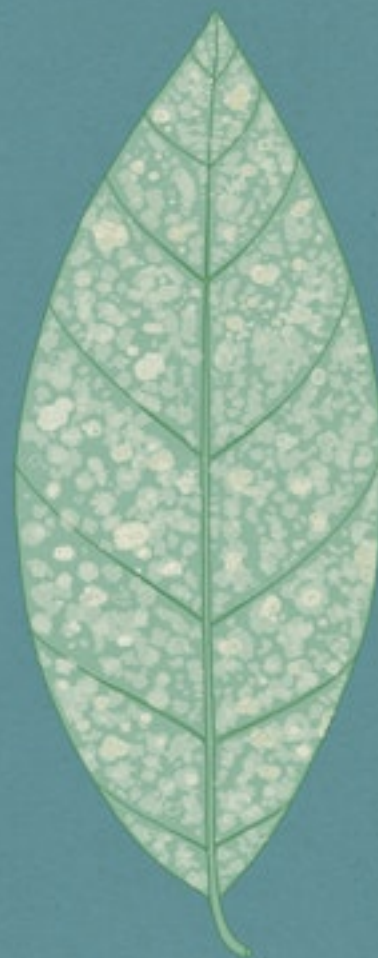




Spores

The incredible myriad of shapes found in spores includes minute spheres, enormous ellipsoid structures and delicate threads or coils – some branched, others star-like. Spore walls can have various layers, and the surfaces can feature all kinds of textures and ornaments.

Circle all the foliicolous fungi



Answers



Zombie ant fungus



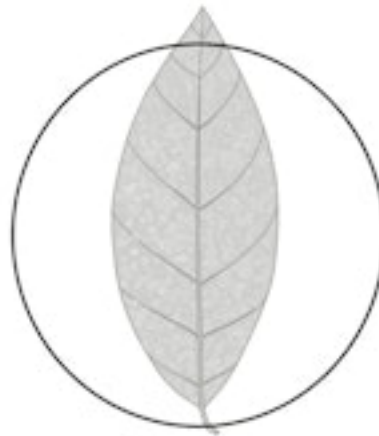
White muscardine disease



Ant fungus



Dong chong xia cao



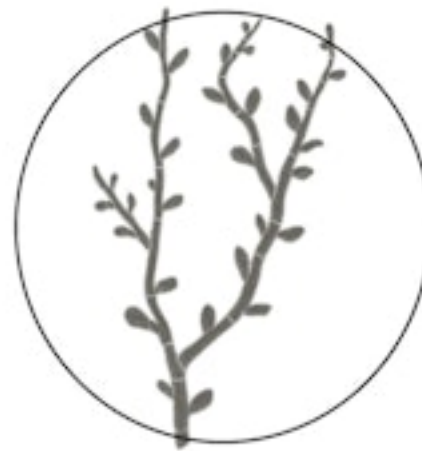
Leaf with a mixture of fungal colonies on its surface.



Tricharia urceolata

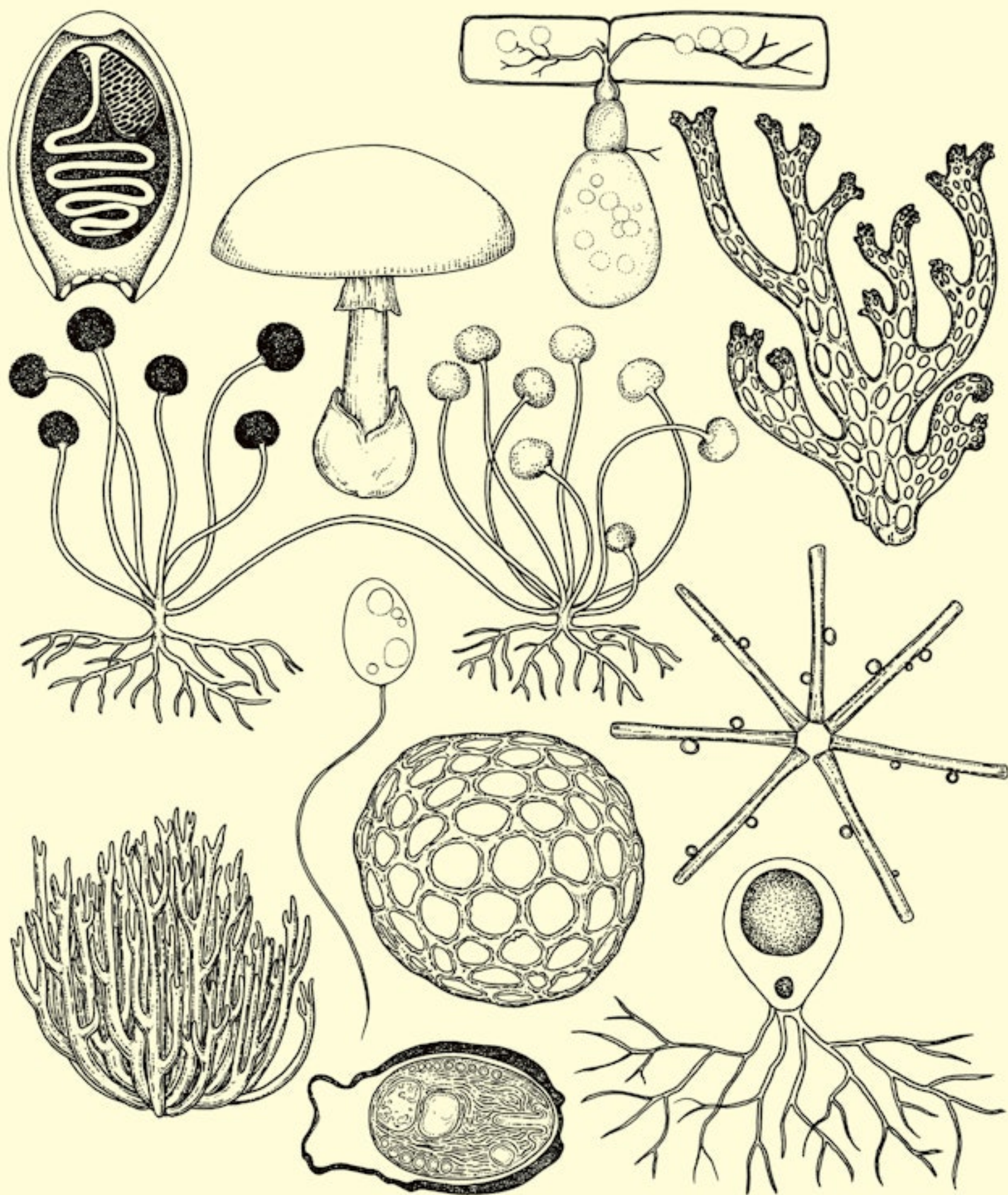


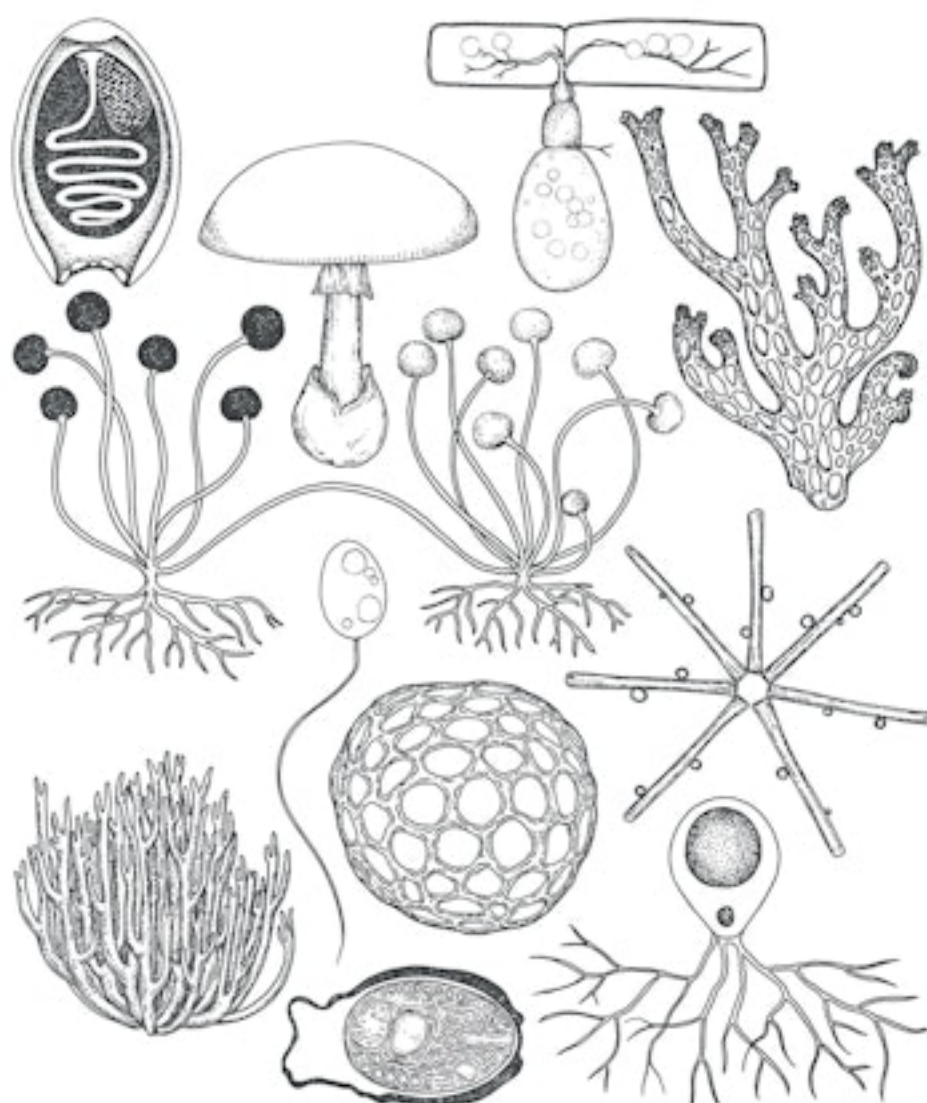
Parenglerula macowaniana



Meliola urariae

Colour in these fungi





Fungi

New species of fungus are constantly being discovered. Scientists think we have barely scratched the surface and that of the estimated 2.2 to 3.8 million species on Earth, fewer than 5 per cent have been identified.