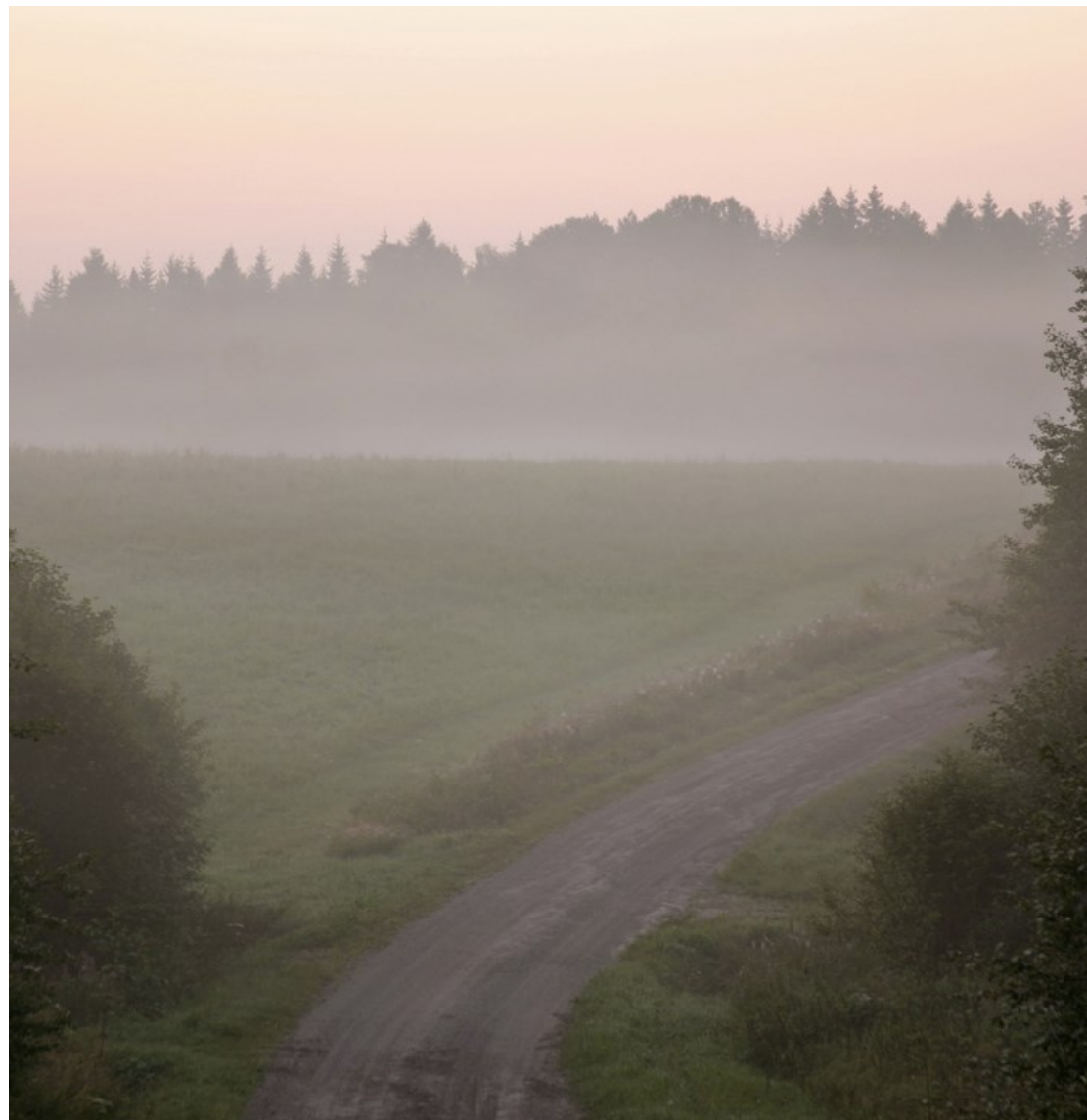


Explore the Air Around You — Particle Photo Guide

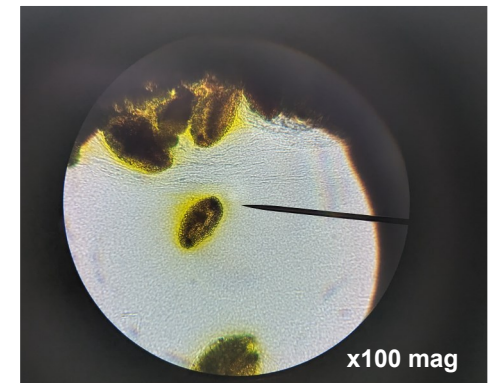
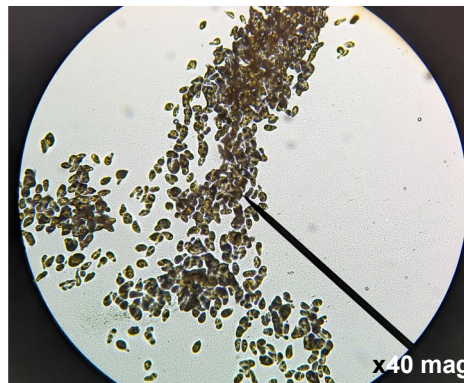
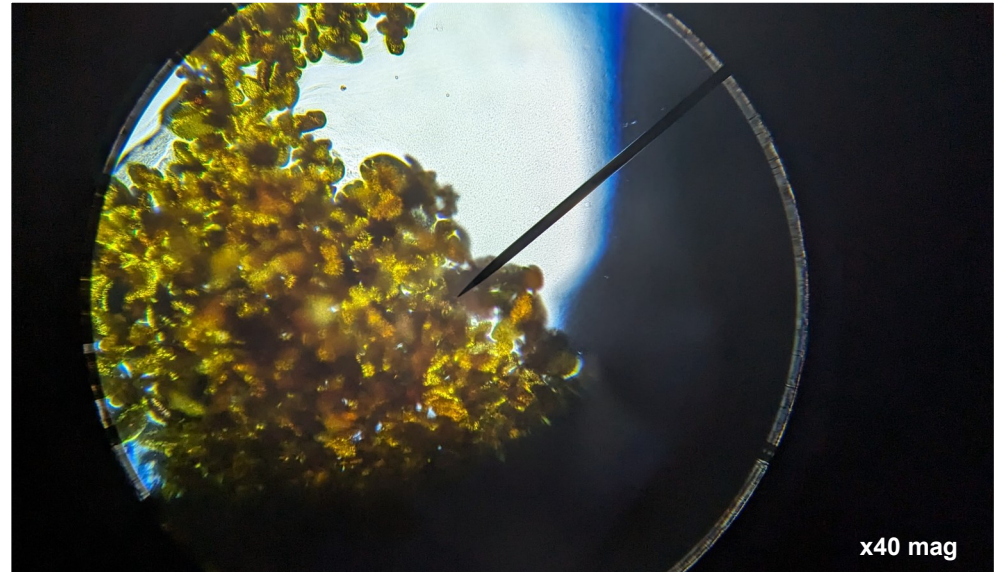


Pollen

Pollen grains are particles generated by plants to reproduce sexually. Each grain of pollen holds a single plant sperm cell.

When the grain reaches a flower of the same species, the sperm is able to fertilize the eggs inside the flower. Each plant species has its own unique looking pollen. The kind and amount of pollen in the air changes with the seasons, but is also influenced by the weather. Some plants use the wind to blow their pollen away to other plants (like pine trees and grasses), while most flowering plants depend on animals like insects, bats, and birds to carry pollen on their bodies.

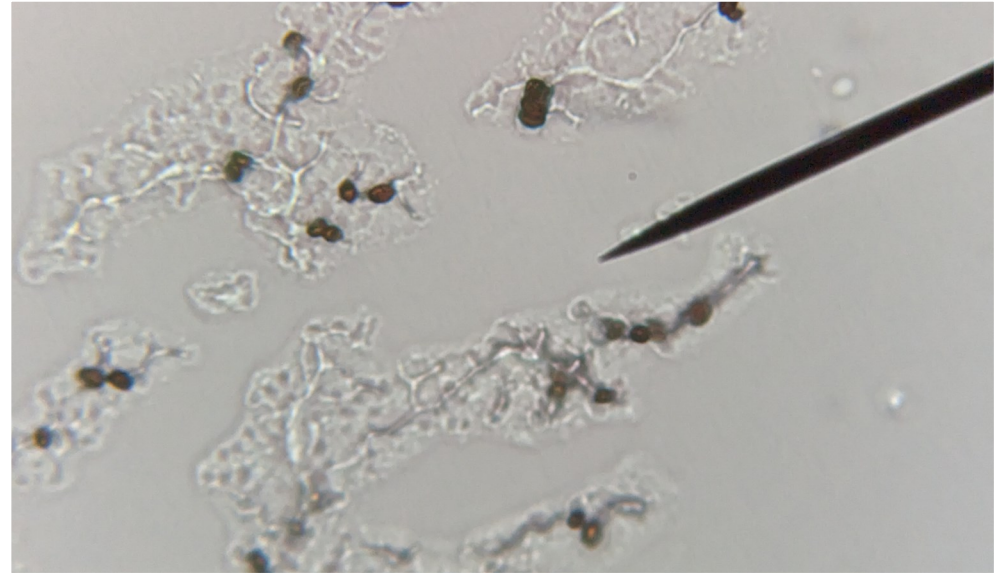
You can tell pollen apart from other particles because they are almost always yellow or orange, and many of them have little spikes that stick out of the grain to help them stick to things. Another way to tell pollen apart from other things is their shape; many pollens will look round or like a slightly deflated football.



Fungal Spores

Fungi are a group of organisms that are neither plants nor animals. Most people think about mushrooms when they talk about fungi, but many other things like molds and yeast are fungi too. Fungi reproduce by spreading tiny cells, called spores, through the air or water just like plant pollen. However, each individual spore can sprout a whole new fungus if it lands in a good spot to grow, and each individual fungi can release millions of spores!

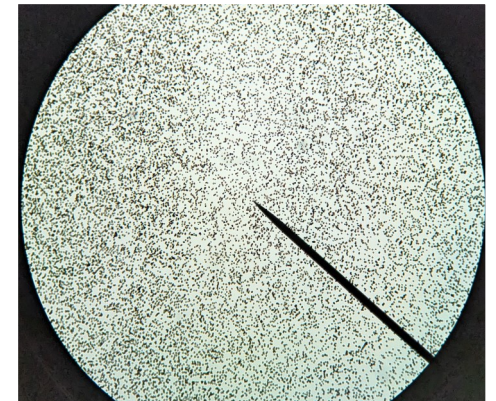
You can tell fungal spores from other particles because they are very small, and often look like tiny black, brown, or tan specks, even under a microscope. If the spore has begun to germinate, or sprout, you may see something like a root coming out of it. An example of this is in the top photo. Spores are almost always smaller than pollen, and will look egg-shaped.



x100 mag



x100 mag

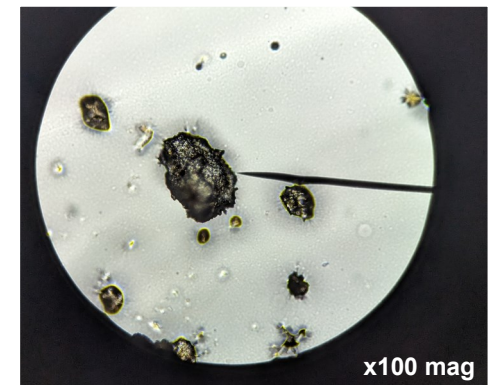
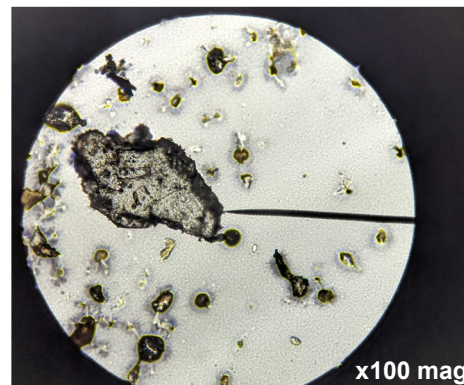
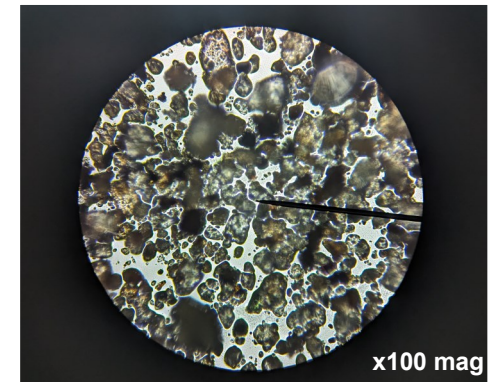
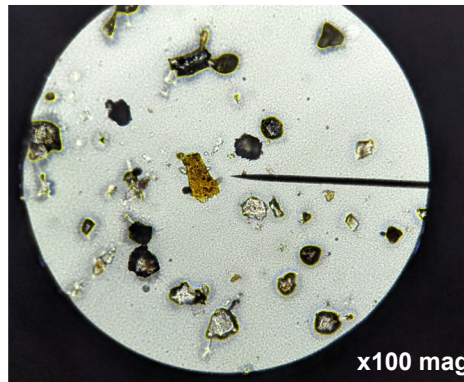
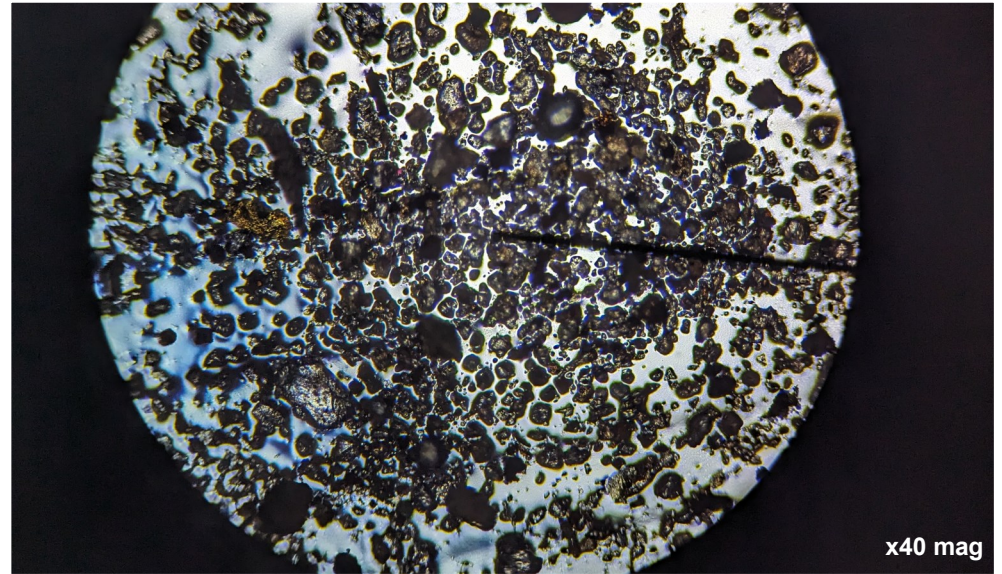


x100 mag

Outdoor Dust, Sand, and Dirt

The dust we find outside is different from household dust. Most of what we think of as dust (like a dusty road) are tiny particles of rocks and minerals. Extremely small pieces of rock become sand, which can blend with small pieces of dead material like leaves and wood to make dirt. Sand and dirt particles can be carried extremely far by the wind. In fact, scientists have found sand particles in the Amazon rainforest that came all the way from the Sahara Desert! When it rains or snows, the particles become trapped in the water and fall out of the air.

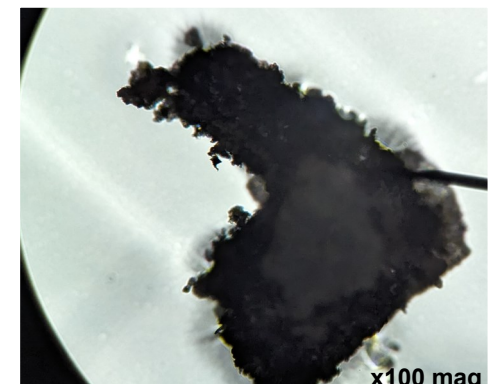
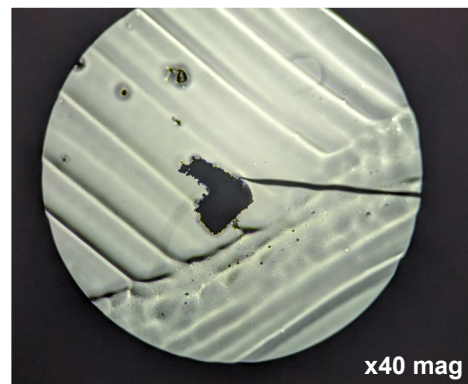
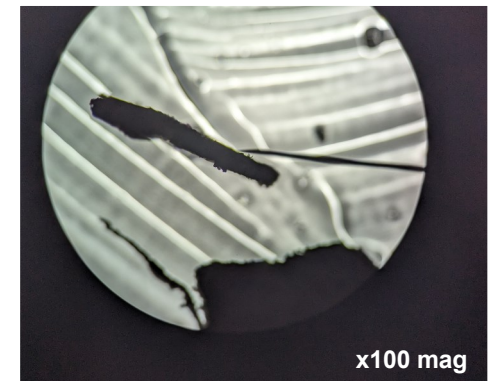
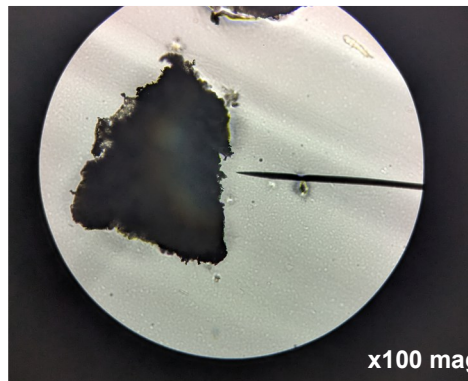
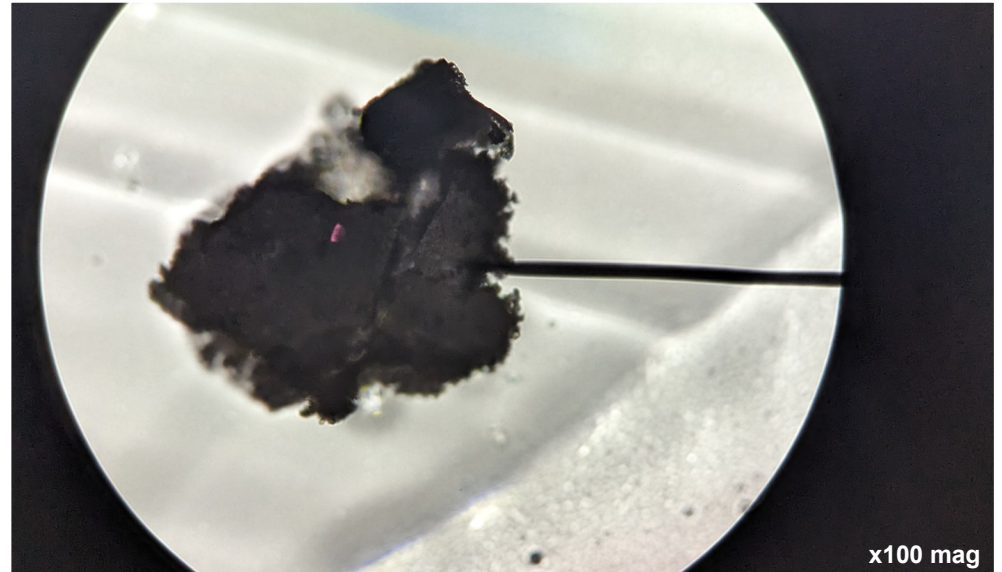
You can tell outdoor dust and sand particles from other particles because they will look like tiny little crystals. The edges of these crystals will be very rigid and well defined, unlike the edges of household dust. If you can see through the particles (translucent), or they look like miniature rocks, you are likely looking at very sandy dirt.



Plant Pieces

Just like sand is bits of rocks and minerals that have broken off, plant pieces are bits of plant material that have broken off of a larger plant. This could be pieces of a broken leaf, or the dried-up bits of a flower. Sometimes you can even find little fragments of bark or wood. As plants grow, they are broken up by wind and weather, and these small pieces get caught in the air and can travel with the wind.

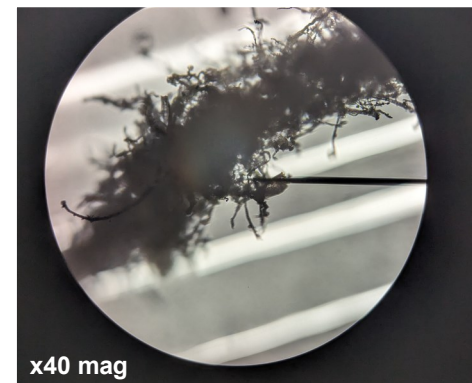
You can tell plant pieces from other particles in the air because they will be fairly large (compared to some of the other particles, like pollen or fungal spores) and irregularly shaped. They will usually be different shades of browns or tans, and may even be recognizable as parts of a flower or leaf.



Household Dust

Dust is a collection of many different small particles. Inside homes, a majority of dust is made up of dead skin cells that fall off of our bodies throughout the day. It turns out that the average human sheds about one million skin cells every day! We also lose a lot of our hair (including body hair, eyebrows, and eyelashes) every day, and the dust gets caught up in these shed hairs.

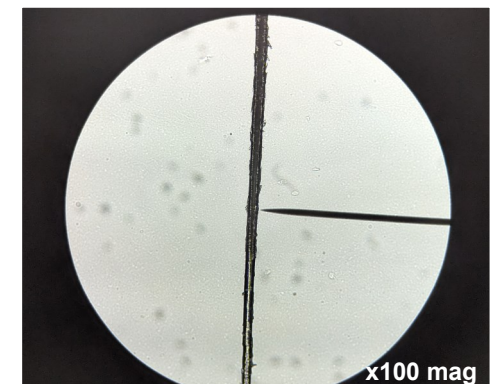
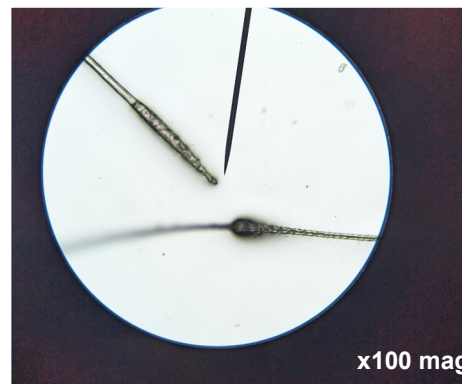
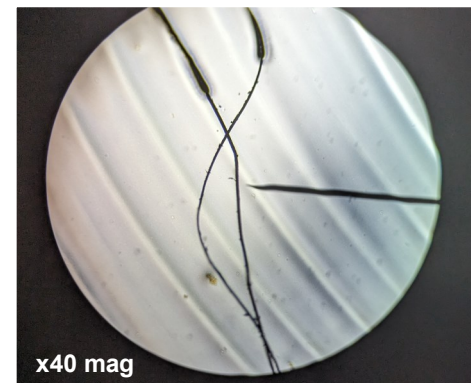
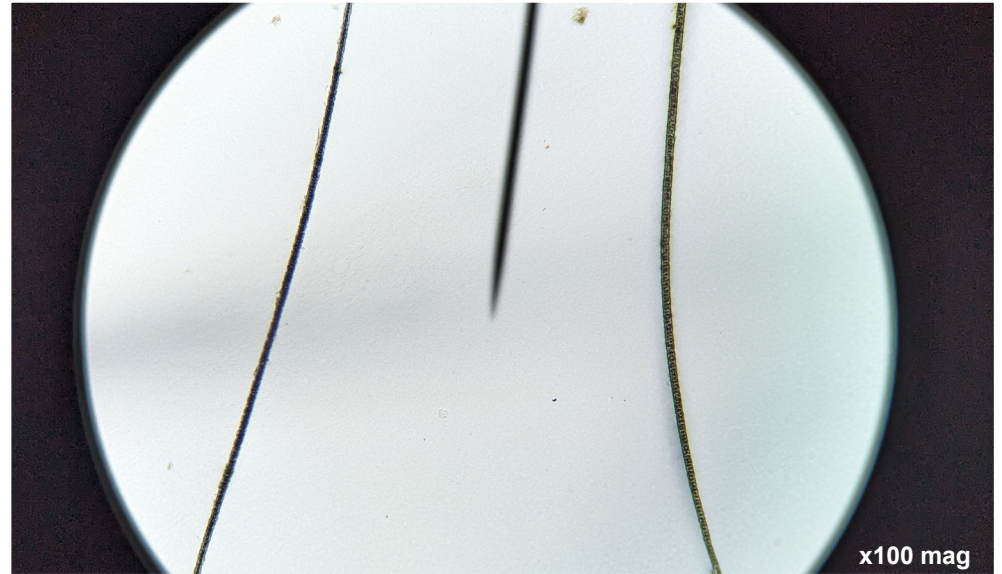
You can tell household dust particles apart from other particles because they are translucent and have a very irregular or lumpy shape. This is because they are made up of organic (living) material, unlike outdoor dust and dirt which is inorganic (not living, like sand). These lumpy cells get caught up in each other and in fibers which eventually form into a dust bunny.



Animal Hairs

All mammals have hair (or fur) that covers different parts of their bodies. Eventually each animal hair will fall off so new hair can grow in its place. Think about how many hairs get caught in your hair brushes or combs. Now imagine how many of these hairs would fall out naturally if you were covered in hair. Many of us have pets that live in our homes or nearby; these animals shed their hairs and they get picked up by breezes and spread around through the air.

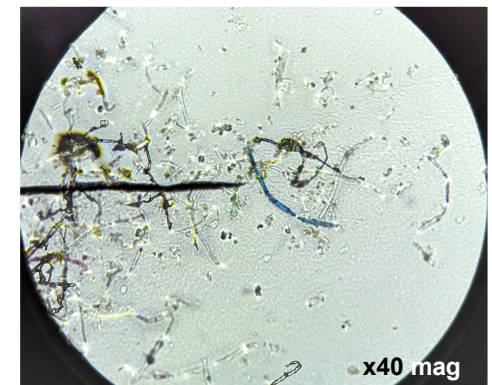
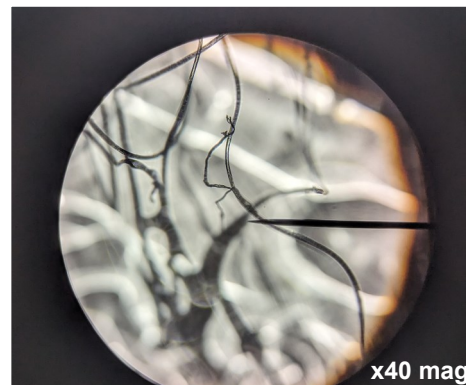
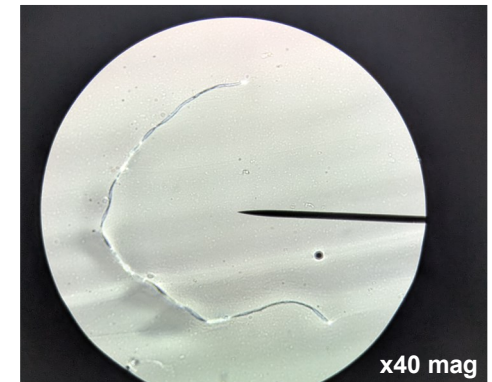
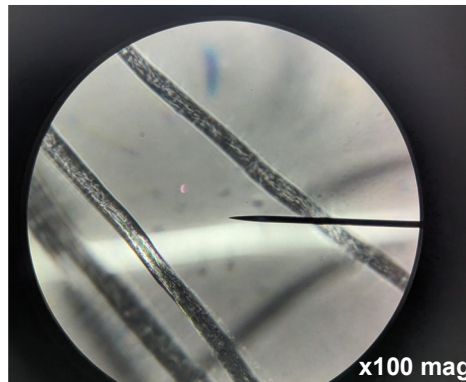
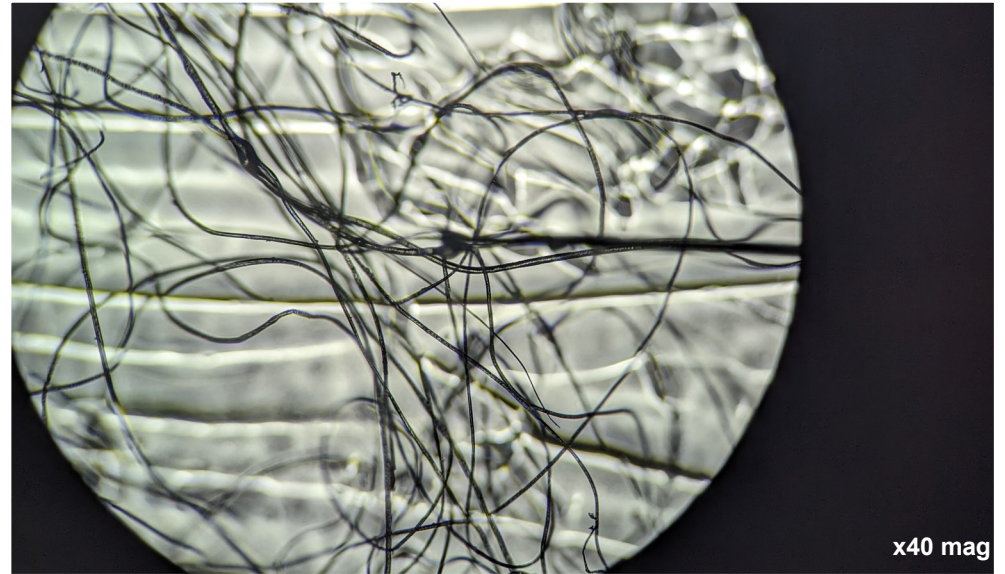
You can tell animal hairs from other particles because they are long, thin objects that look like...hair! The hairs in these photos come from the dog and cat below. Human hairs will look a bit thinner or finer than other animal hairs .



Fibers

Fibers are very similar to animal hair. In fact, some fibers like wool *are* animal hairs. Fibers are small pieces of material that are twisted together to make the thread found in our clothes. Fibers are common in places where clothes are worn a lot, and often catch pieces of household dust. When you look at lint under a microscope, it becomes clear that lint is almost entirely made up of fibers.

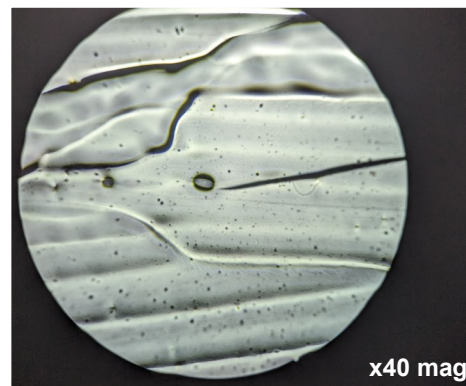
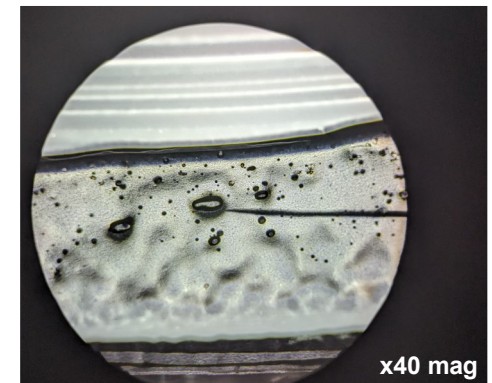
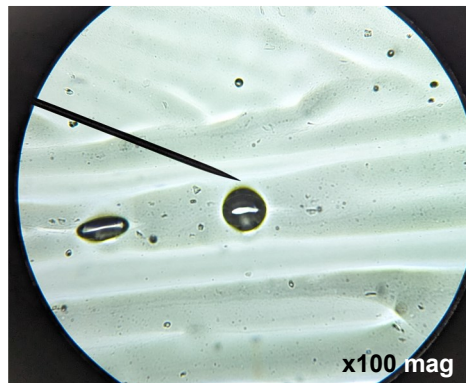
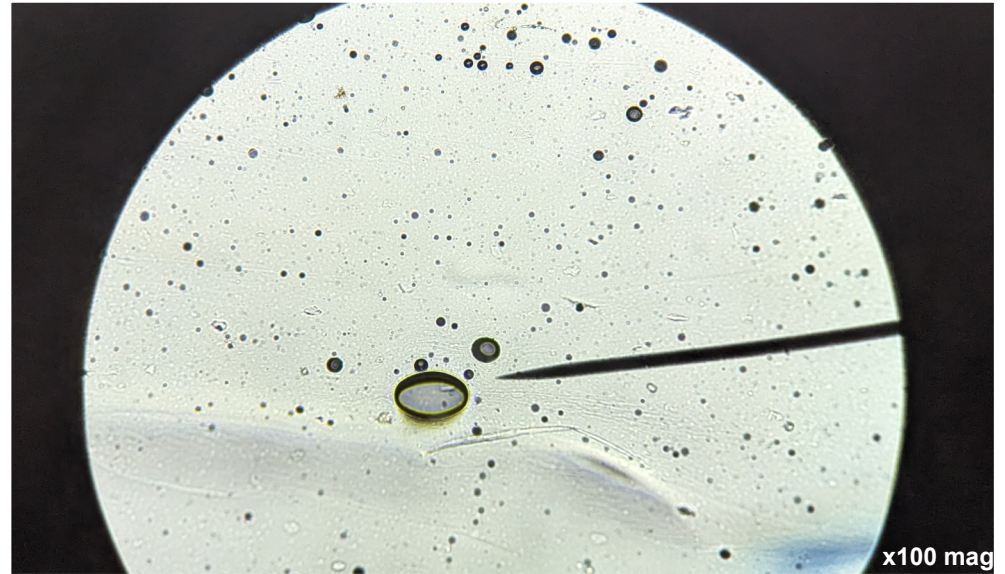
You can tell fibers apart from other particles in the air because they will be fairly large (compared to things like pollen and spores), thin and curly. Many of the fibers may look split or beat up because they get damaged when twisted into threads. Fibers may also be colors that you wouldn't expect because they have been dyed.



Air Bubbles

Air bubbles are NOT a particle that you would find in the air. Air bubbles may look like strange, outlandish objects under the microscope, but they are just pockets of air that have been trapped inside of the petroleum jelly that you spread onto the petri dishes.

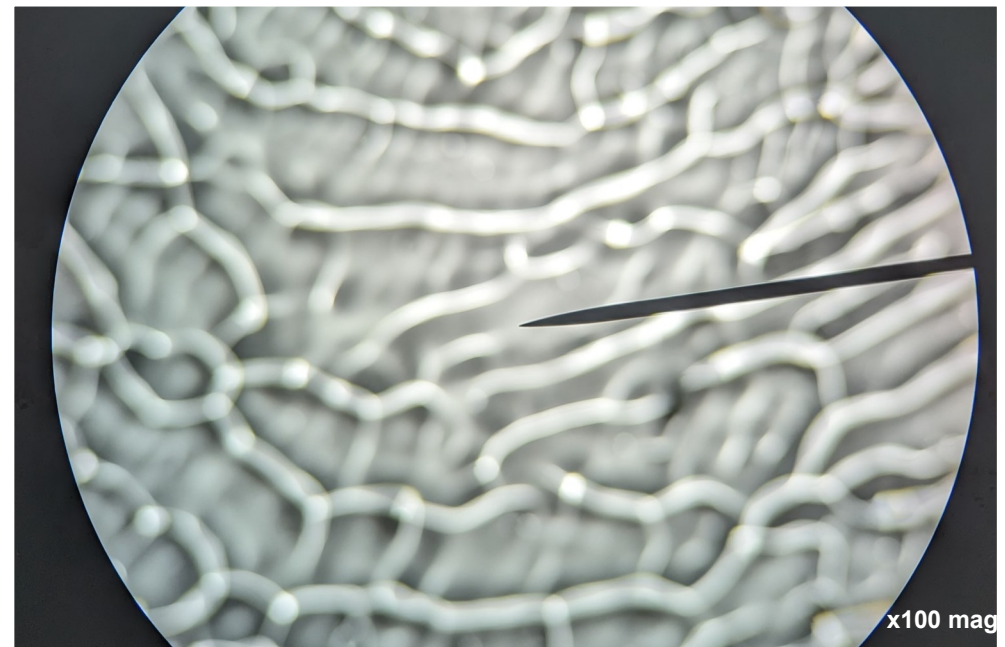
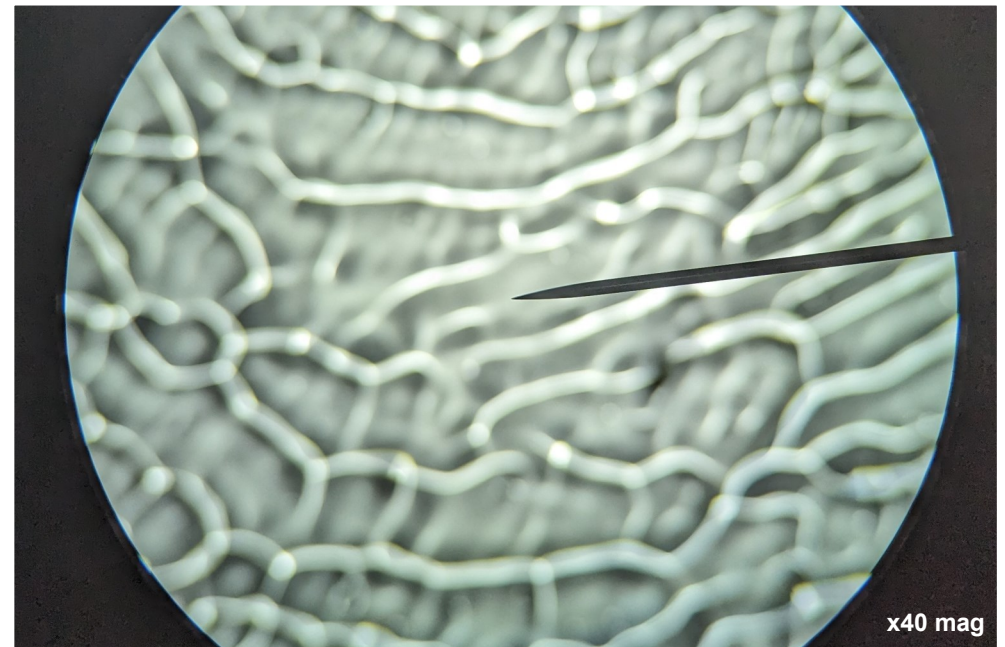
You can tell air bubbles apart from real particles that you can see because they will always be very round and look hollow or empty. Sometimes the jelly will look very dark around the edges and bright in the middle of the bubbles because the light is bending around the shape of the bubble. You can avoid getting too many bubbles in your petroleum jelly by making sure to apply a thin, smooth layer to your dishes.



Fingerprints

Fingerprints are NOT a particle you would find in the air. If someone has gotten their finger in the petroleum jelly, it will leave an impression of their fingerprint. This will look like a strange mosaic pattern behind any particles you find, which can make the particles hard to identify. The jelly will look like it's been covered in bright lines with dark edges because the light is bending around the shape of the ridges left by your finger.

You can avoid fingerprints in the jelly by making sure to only move the dish around by its outside edges, and by not putting your fingers inside of the dish. If you do get petroleum jelly on your finger, you can wipe it off with a tissue or paper towel.

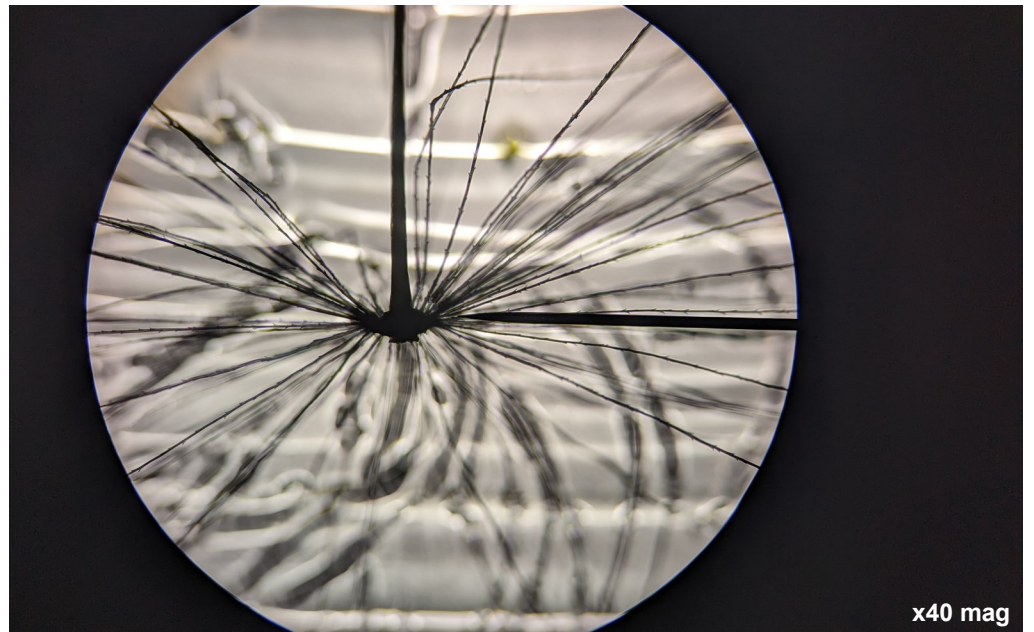


Other Miscellaneous Particles

So many things move through the air, you never know what you might find. A small flying insect may get caught in the sampling plates, or the plant seeds that spread through the air (like dandelions). If you find something interesting that you didn't expect to find, send us a photo at:

BROADN_Outreach@colostate.edu.

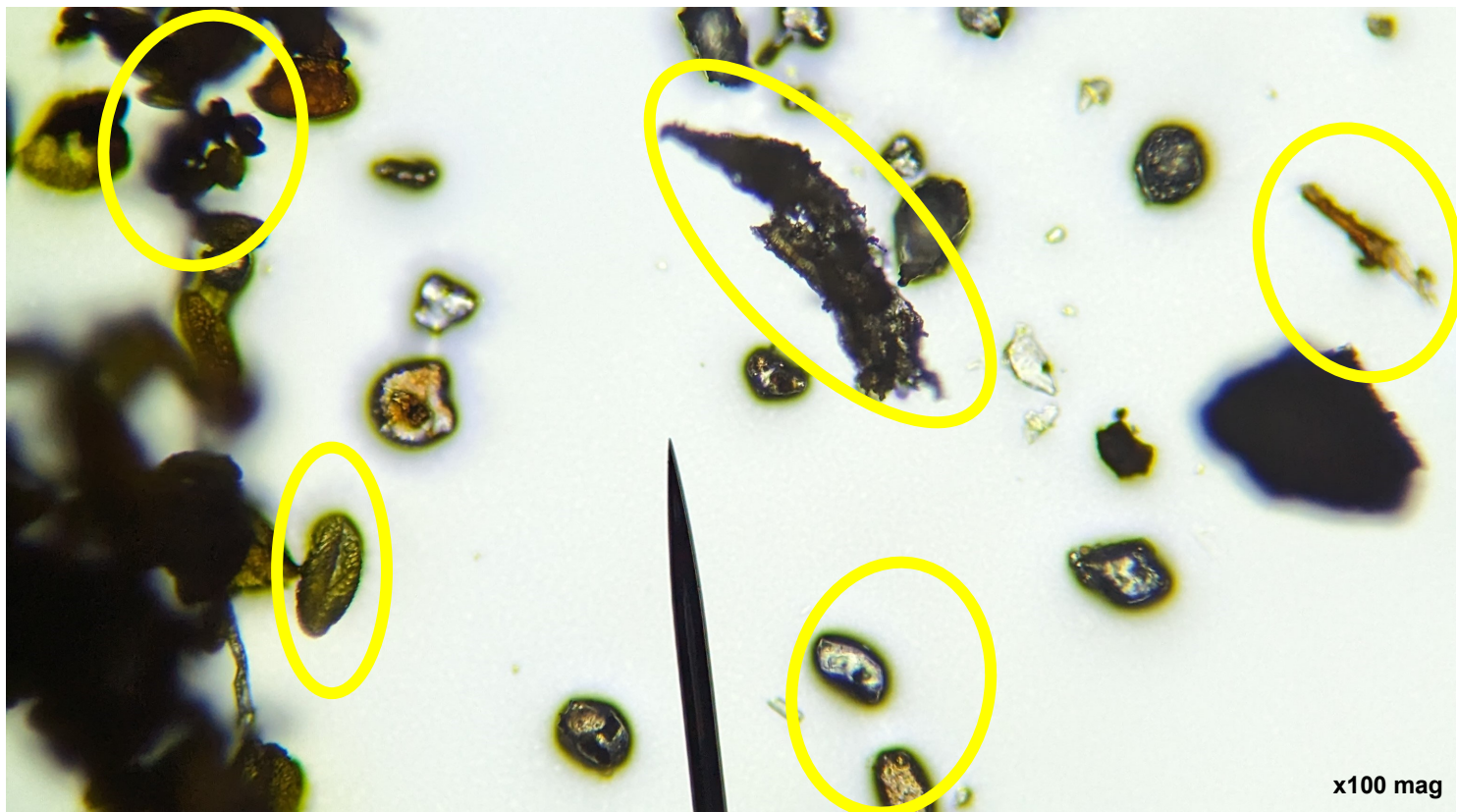
We may even add it to this Photo Particle Guide!

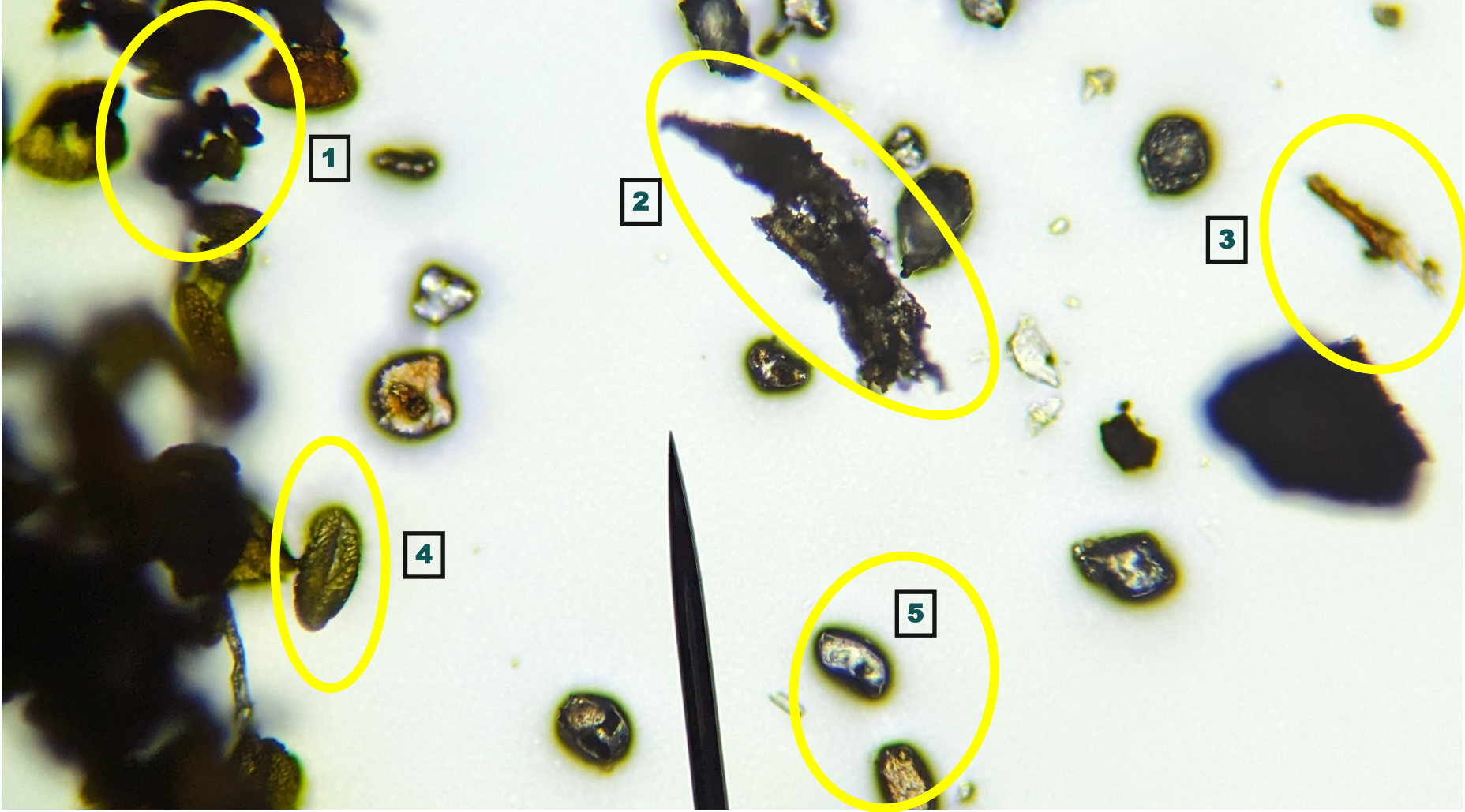


Practice Your Skills

Below is an example of a plate that was collected in Colorado in 2024. This sample was left out in a backyard in June. What kind of particles would you expect to find there? A larger image is on the next page to help you practice identifying the different types of particles that were found.

The answers to these particles are on the bottom of the next page.





1) Pollen 2) Plant pieces 3) Plant pieces 4) Pollen 5) Sand