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Soil ecosystems

Dirt. Gross. Dirt comes from the old english word *'drit'* which means to us today, manure. When someone says dirt or soil, you probably think of filthy little particles of rock and decomposing matter that gets everywhere and is messy. You're wrong. In fact, the dirt is very clean! Obviously it's not clean like a sponge that was in bleach for like, 50 years or something. So, why is it clean, and how? It is clean due to lots of bacteria and fungi! These break down diseases and bad bacteria that are harmful to us.

Have you ever really thought about what dirt does for you and the earth? In fact, without dirt or soil, we would be standing on a giant, really hot rock-like thing.(The earth's mantle). Actually, we wouldn't even be standing, let alone be living! Why is this? Because 10% of earth is covered in soil, 75% is water, and the other 15% is other substances. Soil is made up of many layers, including clay, silt, sand, and other organic material. The top layer is usually humus, which consists of organic and decomposing matter, a top soil, which contains most of the actually decomposing matter, and where most of the worms, grubs, and microscopic organisms live and thrive. Then there's the leaching layer, full of clay and any material carried downwards through the top layers. Finally, there's the subsoil layer, and bedrock. (Bedrock cannot be broken, and is basically the earth's crust), and subsoil is full of sand, silt and clay, and is not ideal for planting. One handful of soil has more living organisms than people on earth, 1 gram of fertile soil can contain 1 billion bacteria, and one acre of land can contain 100-1,000 earthworms, 1 million ants, and about 200,000 mites!

Dirt is made up of decomposing matter such as dead animals, sticks,leaves, and other dead material that breaks down and becomes many small particles we call dirt. It is also made up of teeny-tiny bits of rock that might have been part of a mountain or another big rock

before erosion, wind, rain, and other stuff chipped at it and made it into smaller bits. Another way dirt is made is because water may get into cracks and crevices in a rock, freeze, grow, then crack again and split the rock(s) apart. My point is that we *need* dirt in order to sustain ourselves and live on this earth.

Worms and grubs

Worms and grubs, things people may despise or hate, are actually very important factors for our soil and for all life on earth. The reason for this is because they enrich the soil by feeding on dead material and remains of animals and turn them into compost. All the leaves that fall on the forest floor may be consumed in a *year* by these soil helpers. So, you may say; ‘um, okay, but that's not convincing enough for me, ‘cause like, I really haven't changed my mind about how I feel about broccoli’. Well, don't worry, because I'll tell you more about them right now! First, where do they live, and are there any other species? The answer is yes, there are other species of worms, such as nematodes, wireworms, and earthworms. They thrive in space and feed on stardust……...not! Obviously they don't live in space, and you should know that by now. They *actually* live underground,like you probably got taught. They never usually come above ground unless they get picked up by predators, or it rains. The reason for this is that they live in a moist environment, so when it rains, the vibrations on the surface hit the worms and they come out of the soil, since it's easier to move about on wet soil then dry soil. However, grubs do not rise above the surface as worms do, instead, they only come above to mate and lay eggs after they have turned into beetles. Although, grubs can also be bad because they may eat plant roots, and that can kill the plant, but that doesnt mean everything they do is bad, because they also eat dead material that further enriches the soil. Same with worms, they also do the same, and not only that, but they also help when they move through the soil, because they ‘eat’ the soil, leaving behind casting that enrich the soil. The tunnels also help air and water circulate through the soil. When worms and grubs are decomposing, they release nutrients. This is called the carbon cycle. There are two main processes for the carbon cycle; immobilization, and mineralization. Immobilization is when

organisms in the soil take mineral nutrients and turn them into plant tissue that helps the earth. The second process is when living organisms die and release nutrients from plant tissue into the soil. Both of these are very important for the earth and for life.

Now that I have told you about what they do for us and where they live, but that still leaves one question, and that question is this: what is their job? Now, the answer to this is really quite simple, the job that these creatures have is to break down everything that used to be living, and break it down into food for all plants and the earth. without these amazing bugs, we would all be dead, that's why we need them.

Moles

When you hear the word moles, two things might come to your mind. One; those little furry disgusting mammals that wreck your garden and ruin your yard. And two; those little lumps or deformations that appear on the skin and are really annoying. And you are right to think that, because it's true. There *are* things that can grow on your face called moles, and there *are* little furry creatures that wreck your lawn. But that's not the only thing that they're good for. (the mole animals, I mean). They're good for…..SOIL DECOMPOSITION!!!! yes , I know, you probably thought that moles were good for nothing, but they're not. This little mammals are very fascinating, so be quiet while I tell you about them.

The mole lives underground mostly its whole life, except to gather food and maybe just to see the 'upper world'. However, some moles, such as the European mole, never ever leaves its home unless it has to, it doesn't even have a door to above ground! The reasons that it would have to leave its home is if its tunnels flood, it needs new bedding, or its mother kicked it out. The third one only happens once in a moles life, because moles are only born once. A mole has a huge underground network of tunnels that can stretch in every direction. You may have thought that they only have little tunnels that you happen to step in and collapse, but theses are just just below the surface tunnels, and are temporary, so don't feel bad if you smash one. Branching off of these just below the surface tunnels are more tunnels, dump tunnels, bathrooms, food storage, and more. Dump tunnels are not escape routes, they are just ways to excavate dirt out of the moles home. Yes, a mole has a GINORMOUS kingdom

underground, so how again does this help us and the earth? Well, I'm not there yet, I'm still talking about moles and how amazing they are. Now, I'm not doing a report on specifically moles, so I won't waste your time droning on and on and on and on……..ok sorry. Moles eat mostly worms, which are about 90% water, and are perfect for moles to live off of. So, how does a mole find worms? Whiskers! Its whiskers give off a warning signal that moles detect right away so the mole can find out what it is that sent off the "alarm". If a mole finds a worm, it will most likely eat it, if not, then it will store it in its food pantry until it needs it in a dire emergency. So how does a mole keep worms from crawling away? It doesn't kill them, because if it did, the worms would dry up and they would be useless. Instead, the mole simply bites off their heads. This doesn't kill the worms, it just simply delays the worm from growing a new head, since it takes about a month to grow one. The worms are also immobilized, because they cant move without a head!

Ok, now I'll tell you about what they do for us and the earth. You see, when a mole digs its tunnels, it moves through the soil "churning" it up and giving it nutrients. The mole is also leaving its droppings behind and maybe some dead worms and other bugs that will be broken down into organic material for plants. Moles also help us by feeding on bad bugs that may be harmful to us. So what's their job again? To eat bad bugs and other organic material and turn it into nutrients for our soil! *Did you know that a mole once killed a king? Yes! Its true! A king, William the third, was riding his horse nce when his horse tripped on a molehill. William was thrown off of his horse and was mortally wounded. He died from his injuries two weeks later!*

Microscopic organisms

Microscopic organisms are amazing! Even though you can't see them, (hence the name microscopic), they are doing a ton of things for our earth! They are everywhere in the soil, between cracks, inside the soil, and everywhere else. In fact, one gram of fertile soil can contain 1billion bacteria in it! A gram is about the size of a penny! There are lots of different types of bacteria, such as Archaea bacteria, actinomycetes, nematodes, and many more. Thes all help us like I have said many times already. While consuming organic matter and each

other, the bacteria are producing more material that is healthy for plants to thrive and live. Another very important bacteria in the soil is the mycorrhizal fungi. Mycorrhizal fungi help trees grow by absorbing sugar from the plant. In return, the fungi give nutrients back to the plant. So how does mycorrhizal fungi form? Well, the fungi forms by being attracted to any dead, organic matter. When the fungi 'see' this dead material, it climbs all over the root network of the plant and help it. This is called a symbiotic relationship. Some other symbiotic relationships may include cleaner wrasse and moray eels, clownfish and sea anemones, and the plover bird with crocodiles. However, this symbiotic relationship between the fungi may hurt the tree. Although, it only usually hurts bushes or shrubs. So, what can we do to help these animals in the soil and how? Well, for starters, do **NOT** use pesticides on your plants or your garden, this is not healthy for them or the bugs. Another way you can help the soil is by maintaining it and not using traps on moles, even though they may wreck your yard, watering your yard, and being eco-friendly around the house and anywhere else by recycling, picking up trash, and reducing the amount of water you use. Over all, worms, grubs, moles, and microscopic organisms are very important for our world and we depend on them to live. Why? Because they provide nutrients to our soil and help it. They also help the plants that live, and we need plants to survive for food and oxygen, so without these helpers we would die!

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