te manawa
TE PAPAIOEA PALMERSTON NORTH

Discovery Time

10 Paengawhāwhā | April 2020

Get Creative!
Kia auaha

Research
Kia tūhura

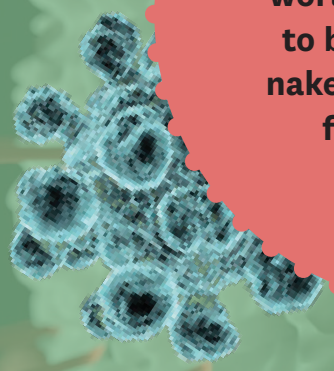
Think
Whakaarohia

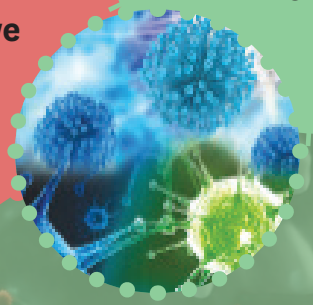
Ask
Pātai mai

Welcome to the world of MICROBIOLOGY!

Let's look very closely and take a peek into a world that is too small to be visible with the naked eye. What do we find living here?

The smallest living things are called microorganisms or microbes!





Aren't they pretty?

Sometimes **bad** microbes can give you an upset tummy

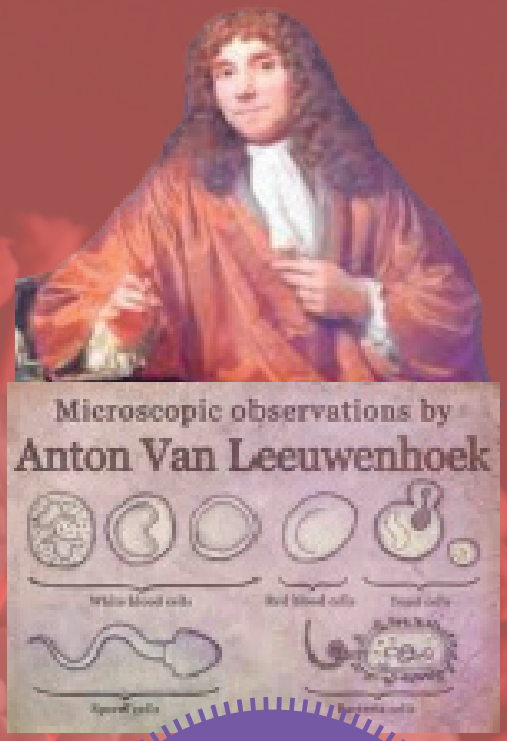
Some microbes are **good** for us, like these healthy gut microbes

The most famous **BAD** microbe at the moment is the CORONAVIRUS named Covid-19.

Why is Covid-19 so much trouble?

Microbiology

Fun Facts!



A Microbe is the smallest and simplest form of living thing. Microbes can only be seen through a microscope.

There are five million trillion trillion microbes in the world and they make up the largest portion of living organisms on the planet.

The Dutch Microscopist, Anton Van Leeuwenhoek discovered the first microbe in 1675.

Microbes can work alone or in groups

Microbes can be a useful friend for us too. They help us to make yoghurt, wine, beer, pickles and bread.

Microbes might even be able to survive in space!

Microbes come in many different shapes, sizes and varieties. **Why not draw some whacky looking microbes?**

Autotrophic microbes make their own food where heterotrophic microbes depend on other living organisms for their food.

Microbes can live anywhere. No climate is too hot or too cold and no place is too dry or too wet for them

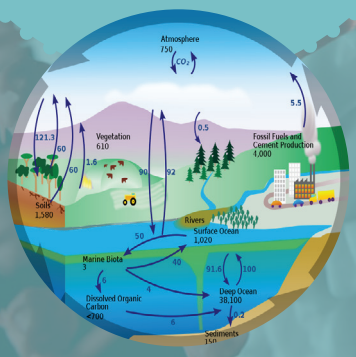
MORE Microbiology

Fun Facts!

What is a host?

Some organisms can cause diseases in a host and they are called “Pathogens”. They enter our body through air, water, food, contact or insect bites. They spread diseases from an infected person to a healthy person.

Microbes play an essential role in the relationship between people and the environment. They are part of the carbon cycle and the nitrogen cycle, and they decompose waste and other dead things.



There are microbes which grow in food and produce toxic substances making the food poisonous causing sicknesses and even death.

Some microbes help to make medicine such as antibiotics which kill or stop the growth of disease-causing microorganisms.

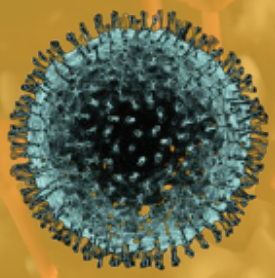
Sometimes microbes are used to produce vaccines against some diseases such as polio, cholera, typhoid, smallpox and hepatitis. Vaccines are dead, or weakened microbes introduced into the body to produce antibodies which protect the body from disease-causing microbes.

Have you been sick before and had to take antibiotics?

What is a virus?

Hi! I'm Himani, I'm a science educator at Te Manawa! Did you know that there are five different types of Microbes?. They are Virus, Bacteria, Algae, Fungi and Protozoa. Let's take a look at how these are different and how they are the same!

A virus is a submicroscopic (very small) thing that is infectious (that means it's catchy!). Viruses are found inside of other living things.

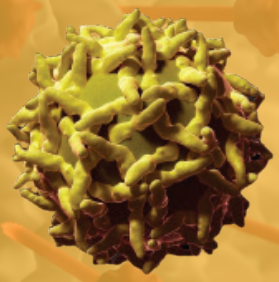


Coronavirus

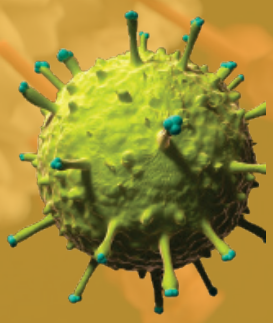
Hepatitis C

What does a virus look like?

Scientists at the University of Wisconsin use X-ray crystallography and cryo-electron microscopy with 3D reconstruction to make these images of viruses.



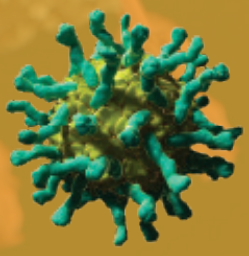
Yellow Fever



Swine Flu

Do you have Playdough, cottonbuds and pompoms? Why not make a cool model of a virus?

Influenza virus



Polio

So, what's a bacteria?

Like a virus, bacteria are also a very small living thing, but they are generally 10 to 100 times bigger than viruses. The biggest difference between viruses and bacteria is that viruses must have a living host - like a plant or animal - to multiply, while most bacteria can grow on non-living surfaces.

Scientists grow bacteria in petri dishes in a lab. This technique is useful to find out what and how much bacteria is present on different surfaces.

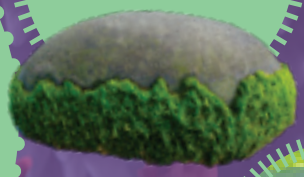
Bacteria are present in most of the habitats found on earth.

Bacteria were among the first life forms to appear on earth.
They were even here before the dinosaurs!

Now, let's look at algae!

Algae are a large group of diverse living organisms that use photosynthesis to produce their food just like plants. The difference between algae and plants is that their cells are not clearly organized into different types of tissue with different functions.

Seaweed is an algae



Algae are always found in marine enviroments, the ocean, rivers, lakes and swamps.
Do you live close to a body of water? Go for a walk to a river, swamp or pond and see if you can spot some green slimy algae!

Algae can be useful! Some species can be used as food, as fuel, as medicine and also to help combat climate change!

Find out more here!
www.thoughtco.com/human-uses-for-seaweeds-2291917

Who knows what a Fungus is?

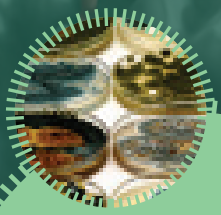
Me! I do! I know some fungi!

Fungi can't photosynthesize like plants or algae can. They absorb their food instead of making their own.

What does photosynthesis mean?

A Fungus is a simple microorganism, or living thing, that is neither a plant nor an animal. Some familiar fungi are mushrooms, moulds, mildews, truffles, and yeasts

Multi-cellular fungi grow via networks of long tubular filaments called hyphae. They usually reproduce via spores.



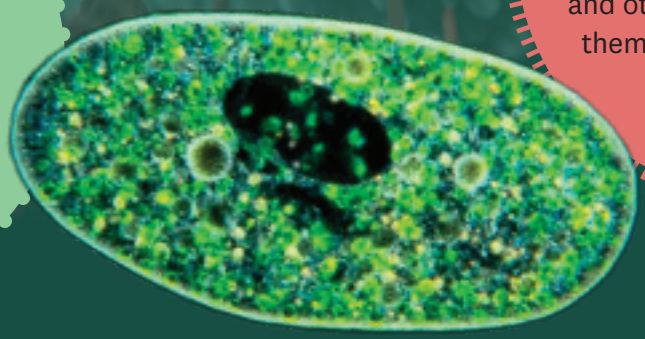
Norm Baker photographed mould (above) and the artist Johanna Martensson uses mould in her art installations! (right). Ask your parent before you try this one at home!

And lastly, Protozoa!

(pronounced: pro-toe-ZO-uh)

Protozoa are small (but not simple) organisms. Protozoa are one-celled organisms, like bacteria. But they are bigger than bacteria and contain a nucleus and other cell structures, making them more similar to plant and animal cells.

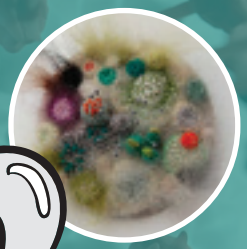
Protozoa love moisture, so intestinal infections and other diseases that they cause often spread through contaminated water. Protozoa are the cause of malaria, giardia and dysentry.



Let's make some ART inspired by Microbes!

Elin Thomas creates petri dishes filled with mould, but she's not using any week-old peanut butter sandwiches. The fibre artist builds her science experiments and recreates fuzzy spores using a felted wool base, and then carefully crafts individual growths using crochet and embroidery techniques.

Can you tell which ones are real?



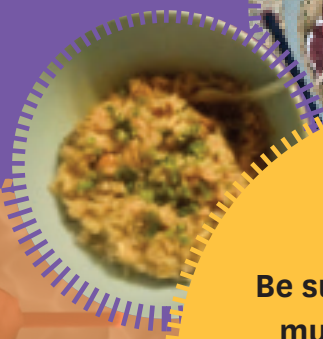
Maybe you can do something like this for yourself, using things you might find around your house and garden – wool, cotton wool, tin foil, buttons, shells, leaves, stones, different coloured paper or material, inside a container like a tin, saucer or plate. You could even try some embroidery or crochet for yourself. If you don't know how ask your parents or a grandparent, or look online! Have FUN!

Why not turn your creation into jewellery?

Kitchen Microbiology!

We have learnt that some microbes can cause disease, but others are good for us! Lot of beneficial bacteria live on our skin, in our digestive system and help us stay healthy. We also use microbes to make food, let's look at some ways that you can use microbes in your kitchen.

Kirsty went mushroom hunting and made this delicious mushroom risotto!



Be sure to check that the mushroom are edible, some can be poisonous. Here's a handy guide! www.wikihow.com/Identify-Edible-Mushrooms

Mirjam has three microbial systems in her Rāhui kitchen. All three are made out of bacteria and yeast that are living together in a symbiotic relationship. This means that they are supporting each other to grow, multiply and transform their food source (the sugars) into something 'new'.
Her three microbial systems help her make **Kombucha** (fizzy drink), **Sourdough bread** and **Ginger beer**.

Here is my scoby in a jar!

Kombucha

I have a scoby to make my own kombucha. This is a symbiotic culture of bacteria and yeast that I feed cold tea with sugar. Once it has been fermenting with the scoby for a while I put it in small bottles or jars and add some fruit or ginger to add a flavour I like. I let it sit for about 3-5 days and then it is ready to drink. It is a natural made fizzy drink. There are lots of websites you can find more information and recipes. You can start to grow your own scoby with the little floaty bits that are in the bottom of store bought kombucha.

Ginger Beer

Because I really like these fizzy drinks I had a look at how to make my own ginger beer. What I discovered is that it is not that difficult to do myself and that I can 'catch' these cultures right where I am now, at home! The culture needed for this process is also made up out of bacteria and yeast. Here is the link I used to start my production.

afarmofyourhome.com/growing-your-own-ginger-beer-plant/

Sourdough bread

So the third culture is one I 'caught' at the start of this Rāhui. I used rye flour and water and left that in my hotwater cupboard, and that is where the magic started! Every day I feed "Herbert" (I decided to give it a name!), some more flour and water. Once I had enough of the culture I used it to bake some bread without using any yeast. It was amazing! When I started "Herbert" the smells kept changing from day to day. From baked banana to nailpolish remover to vinegar! It's important to keep checking that there is no mould growing on your culture because that is a microbe that you do not want to be part of this process. There are lots of instructions on the Internet, so search there for more expert advice.
I'm onto my next microbial kitchen adventure cultivating useful mould to make delicious blue cheese!

Discovery Time