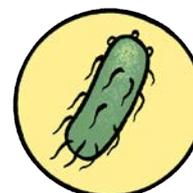


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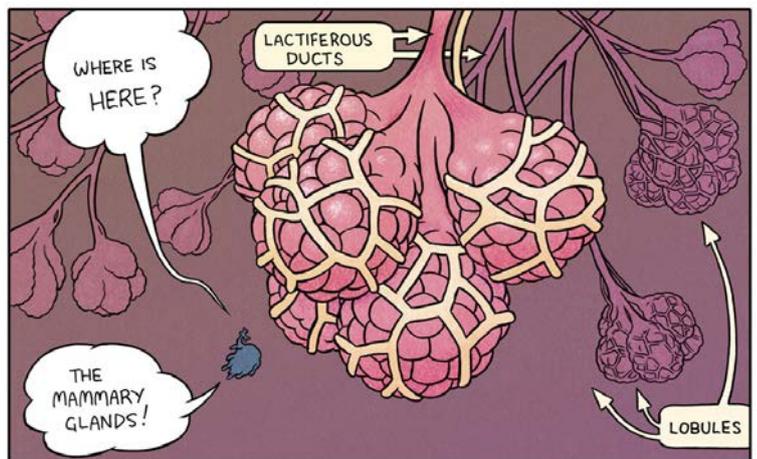
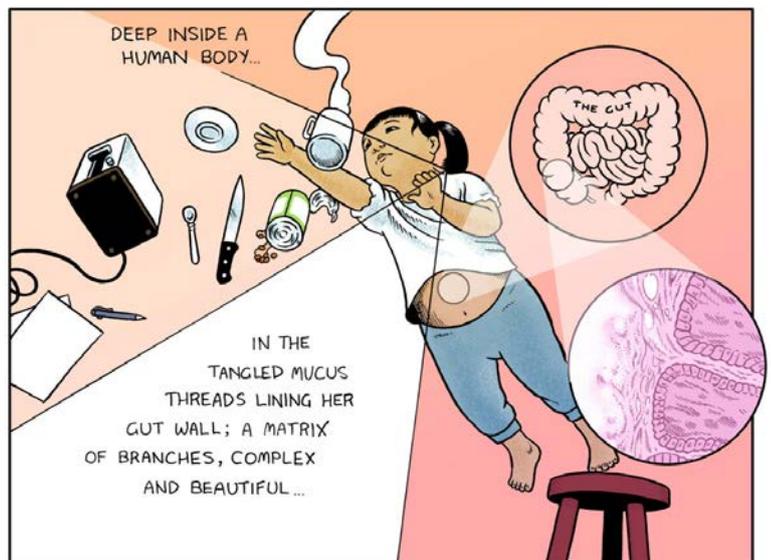
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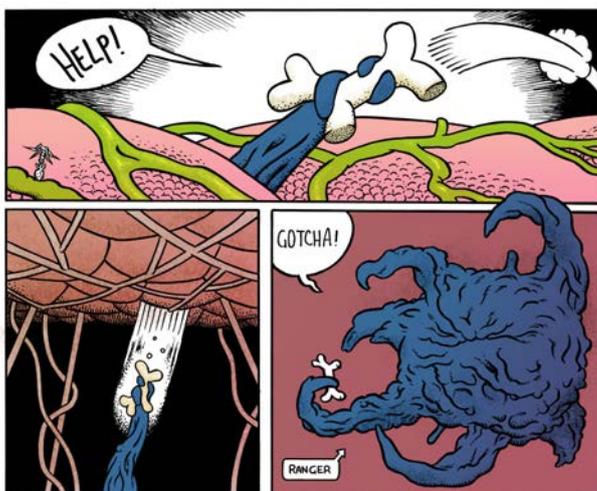
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CHAPTER 2: THE UNDERNEATH

15. WHAT IS THE UNDERNEATH?

See pg 16

Even though our intestines run deep through our body, the space inside them (called the lumen) is technically outside of our body. From the perspective of bacteria and other microbes living within this rounded lumen cavity, everything below the wall of the gut is 'underneath' them.

Our gut wall serves two main functions: to absorb **nutrients** and **water** inside the body, and to keep **microbes** outside the body. Most microbes do not try to break through the barrier presented by the gut wall, however some bacteria (such as *Salmonella*) try to sneak through our defences to cause an infection.

The outer wall of the large intestine is lined with layers of muscles. The inside wall is punctuated with numerous crypts that absorb water and are lined with mucus-secreting goblet cells.

16. WHO ARE THE SALMONELLA BACTERIA?

See pg 16

Salmonella is a genus of bacteria within the Phylum *Pseudomonadota* (formerly called *Proteobacteria*). This potentially deadly group of bacteria can be found in the digestive tract of many animals, including humans, where they usually cause a mixture of diarrhoea, fever, vomiting and cramps over the period of a few days. Most infections with *Salmonella* bacteria are caused by swallowing chicken and

pork meat, which has been contaminated with faeces from other humans or animals.

Once *Salmonella* gains a foothold and cause an infection in our gut, our body responds by producing lots of mucus, which helps create a cascade of sloppy poo – which we call diarrhoea. However, with some *Salmonella* infections, the bacteria can enter the lymphatic and circulatory system – causing the much more serious disease typhoid fever. Here, toxins from the bacteria can cause the body to go into shock and cause death.

Image: Digital illustration of *Salmonella* bacteria. Source: US Center for Disease Control and Prevention (CDC).

17. WHY IS SAL HAPPY TO BE TAKEN INTO 'THE UNDERNEATH'?

See pg 16

Salmonella bacteria are considered intracellular pathogens, meaning they reproduce inside the cells of their host (much like a virus). Different types of *Salmonella* have different targets in the body and cause different symptoms. But all types must cross the barrier created by the intestinal cell wall, into 'the underneath'. One strategy of the *Salmonella* is to take advantage of being sampled (grabbed) by Dendritic Cells ('Rangers'), in order to penetrate the intestinal barrier.

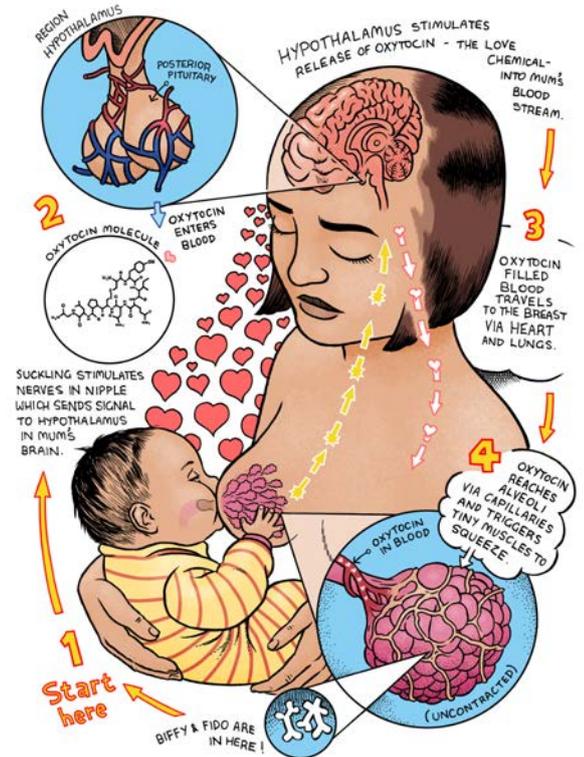
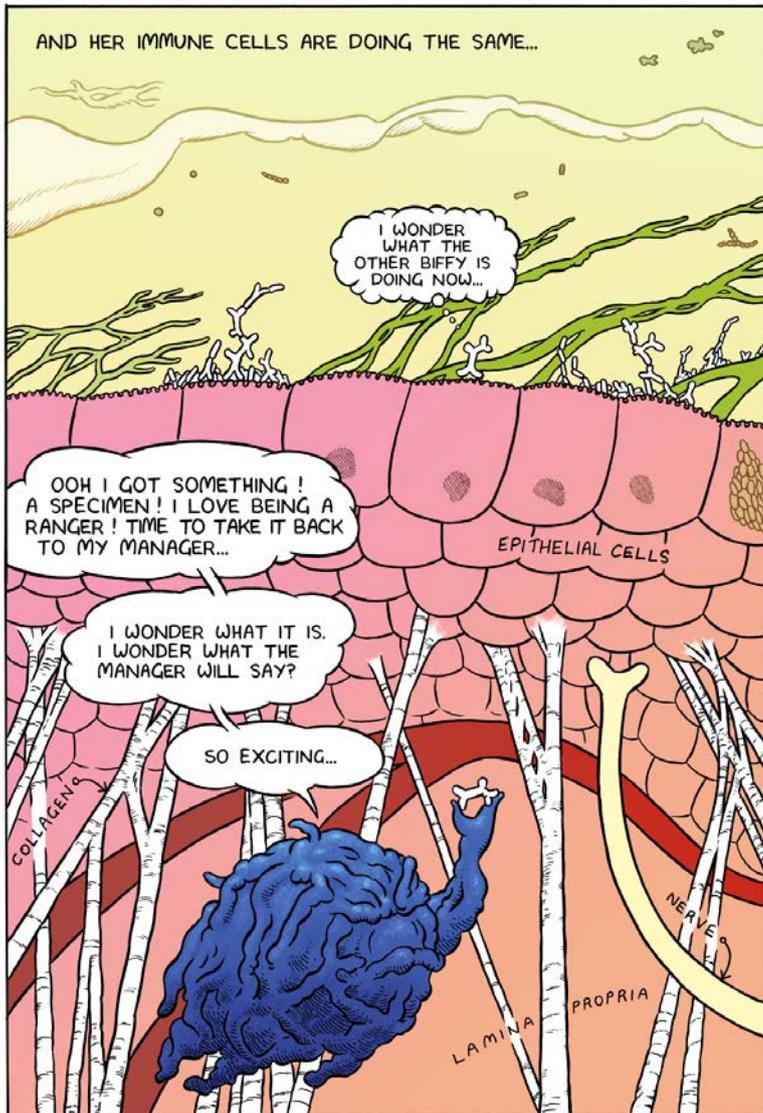
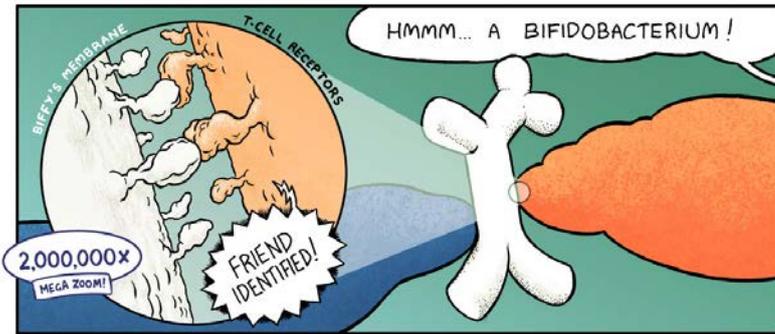
18. WHAT ARE EPITHELIAL CELLS AND MICROVILLI?

See pg 17

The bodies of all animals (including humans) are comprised of four main types of tissue: connective, muscle, nervous and epithelial. Our epithelial tissue is formed by one or more layers of epithelial cells covering the surfaces of our organs, including our skin and soft organs, our airways, reproductive tract, and the inner and outer lining of our digestive tract.

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- Dr Nat Bannan, Year 9 Science Teacher



LEARN ABOUT HOW:

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- healthy gut bacteria are nurtured by breast milk
- bacteria teach our immune system and keep it in balance
- bacteria help digest our food and make vitamins
- bacteria communicate with our brain to affect our appetite, mood and behaviour
- bacteria help our immune system to fight off disease

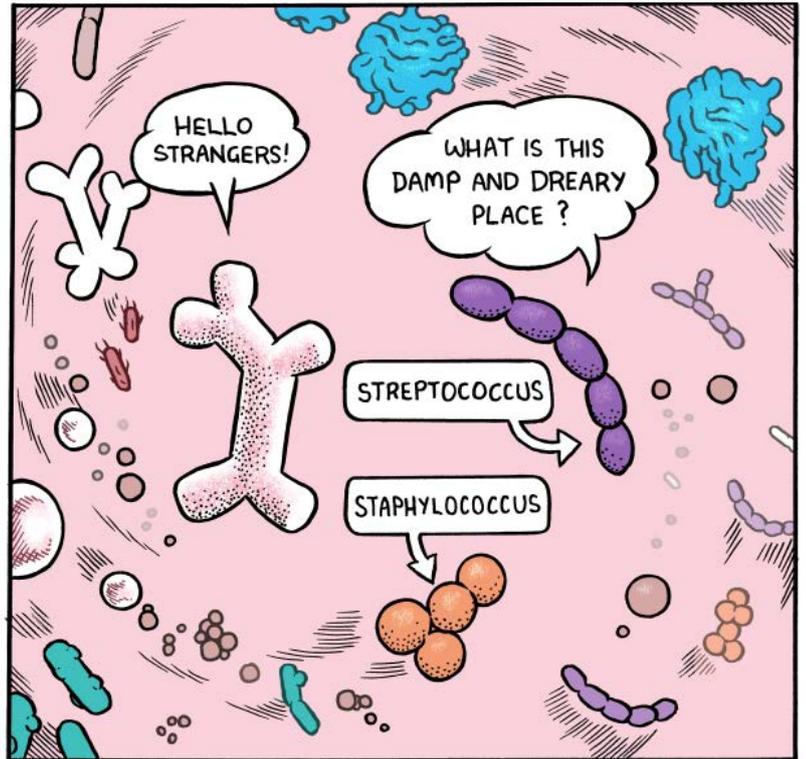
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