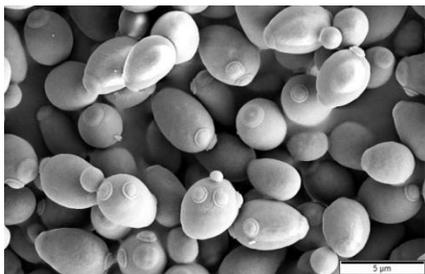


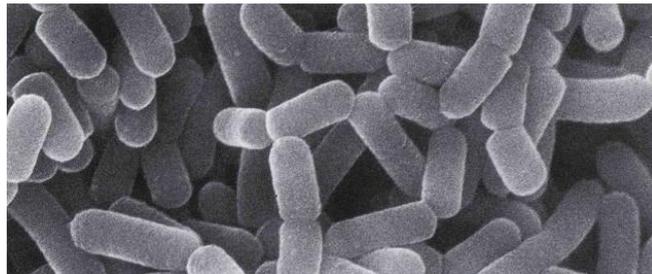
## The Francis Project – Why?

### Bread, Bacteria and Yeasts

- Microscopic organisms such as bacteria and yeasts are on us, in us and around us. They are inside our guts, inside our ears, between our toes and up our noses. They are in our soil, on our vegetables and on the flour that we harvest to make bread. We cannot function well without these microbes.
- Sourdough bread is made in a way that harnesses the action of these bacteria and yeasts to make the bread rise. For thousands of years, all bread was made with a sourdough starter. A sourdough starter is basically a portion of flour and water that is teeming with bacteria and yeasts that have come from the grains of wheat and the air around us.
- In 1857, Louis Pasteur first identified yeast with a microscope.
- Soon after his discovery, industry developed a commercial yeast, *Saccharomyces cerevisiae*. This strain of commercial yeast produced consistent loaves of bread quickly, which meant bakeries could bake more loaves, more quickly, with fewer workers, resulting in higher profits.
- BUT we are now realising that the slower process involved in making sourdough bread produces bread that is easier for us to digest, naturally protects itself from going mouldy (the bacteria make acetic acid which helps to prevent mould), contains more vitamins (B vitamins, Vitamin K) and minerals and less additives than commercially-produced breads.
- People bake sourdough bread all over the world. San Francisco's sourdough bread is so famous that scientists named the main bacterium found in sourdough *Lactobacillus sanfranciscensis*.
- They later discovered that this bacterium is not just confined to San Francisco, but is found in sourdough bread cultures all over the world. No one has ever found this bacterium anywhere else on the planet except in sourdough and in the guts of South African fruit flies!! So now you know why this bacteria education project is called The Francis Project.



*Saccharomyces cerevisiae*



*Lactobacillus sanfranciscensis*

### The Science Behind Sourdough

- Flour contains different sugars that microbes can eat – maltose, sucrose, fructose and glucose.
- Maltose is the most abundant sugar in wheat doughs.
- Most lactic acid bacteria and common sourdough yeasts (the most common yeast being *Candida milleri*) either lack the ability to digest maltose or prefer glucose.
- This is where *Lactobacillus sanfranciscensis* (Francis) comes in. Francis prefers maltose to glucose and in breaking down the maltose it makes more glucose available for those that don't fancy the maltose.

- So, Francis not only provides a source of glucose for the glucose-loving yeasts and bacteria, but in doing so, it is also making sure it gets first dibs on the maltose. This is probably why it is so often found in sourdough starters.
- As they digest these sugars, the Lactobacillus bacteria make acetic acid and lactic acid. These acids increase the acidity of the dough, which is what gives sourdough its distinctive sour flavour.
- Higher acidity gives an advantage to the yeasts and bacteria who like acid – they thrive and out-compete the ones that like it more alkaline.
- They also produce carbon dioxide – this gets trapped in the dough and creates bubbles that makes the bread rise.
- In many cultures around the world, sourdough starters (and the bacteria and yeasts within them) have been passed from generation to generation over hundreds of years – like a family heirloom.

### **Microbial Facts**

- A teaspoon of soil can contain as many as one billion microbes (that's about the equivalent of seven hundred white vans full of cheesy whatsits)!
- We know that some microbes can make us poorly but most of them help us.
- Microbes help us to digest our food and absorb nutrients.
- Without microbes, nothing would break down. We would be literally living on a rubbish dump.
- Did you know that many animals eat poo in order to ingest microbes? We are different. Instead of eating poo, toddlers put lots of objects into their mouths. This is the human way of gaining greater microbial diversity and training our immune systems.
- The greater the diversity of microbes we have in us, the healthier we can be. We want our guts to be like a big playground full of many different individuals.

### **How can we encourage bacterial diversity in our gut playground?**

- 1) Try a different vegetable each week – even if it is just a small bite - **(JEDI POWER)**.
- 2) Think before eating sugary or sweet snacks – these grow the troublesome bacteria **(THE DARK SIDE)**.
- 3) Try to get outside in nature as much as possible **(THE BRIGHT SIDE)**.
- 4) Start to look at the ingredients in the food you are eating – the less processed it is, the better. **(THE SHERLOCK SIDE)**
- 5) Learn to cook – this is one of the most important skills you can learn in life **(YODA POWER – wisdom)**.

