

MicroChat: How old am I?
(Rachel Armstrong and Kenneth Timmis)



Artwork by Joana B. Caldeira, University of Coimbra

Maisy: Mummy, your friend Gladys asked me yesterday how old I am. I told her 7 years and 7 months, and she replied ok: you are 7. But surely I am older than 7?

Mummy: yes, darling this is true, but you are both right. You are two different people coming to the same question from two different points of view.

For Gladys, who has lots of children and even a couple of grandchildren, keeping track of birthdays and ages is already difficult enough when counting in years. You are an individual thinking about yourself, and how many days it will be to your next birthday party and maybe those of a few of your closest friends who also invite you to their parties. So it is important to you to think about your age also in months.

Maisy: Oh, yes: Rachel has her birthday next week! Can I have a new dress for it?

Mummy (cough): well, I'll have to think about that...and discuss it with your father...

Maisy, brightly: No need: I already did! He said: "ok.....if mum agrees...."

Mummy, smiling: Hmm...I think I'll need to talk with him directly before deciding.....I wouldn't be surprised if you already have one in mind.

Maisy: Oh yes, the lovely one in the department store we were in last week...the one covered in sparkly things...you remember....you said it would be awful to wash.

Mummy, grimacing: Oh, that one! Well, we'll need to revisit this issue tomorrow, after dad and I have had chance to discuss things after you have gone to bed.

Maisy, smiling: Okay, I'll go right away so that you can talk together now!

A learner-centric microbiology education framework

Mummy: But before you go to bed, we should consider a bit more the question you get asked all the time: how old are you?

On one hand, you might assume that your age is the same as the number of candles on your birthday cake. And that's true in one way—your birthday marks the day you were born, when you became your own person, separate from me after you had been in my body for 9 months. But that's only part of the story.

Your body, like your bicycle, is made of lots of different parts with different functions, and not all of them are the same age. Some parts of you—like your skin cells, blood cells, and the tiny cells that fight germs—are super young. They're being made all the time, sometimes just seconds ago! Your body is always busy replacing old cells with new ones to keep you healthy and strong.

Then there's your microbiome—the trillions of tiny microbes, like bacteria, that live in your intestine, on your skin, and pretty much everywhere in and on you. Microbes are part of you and make up half of your body cells. You started collecting these microbes when you were born, and you keep picking up new ones from food, people, your dog Scamp, and the world around you. Some of these microbes are just minutes old, while others have been with you for years.

Maisy, thoughtfully: Oh, yes, I know about my microbiome: our teacher talked about it last week! It helps me digest my food so that I get plenty of energy to play soccer.

Mummy: Absolutely! (I did not think the microbiome was already part of your lessons!) But let's go a bit deeper.

Each cell in your body is made of smaller parts, like proteins. Proteins are built from building blocks called amino acids (amino acids are the Lego blocks of protein space ships). Your body gets protein from the food you eat, like beans and fish. When food enters your digestive system, it gets broken down into its building blocks. For example, the fish proteins are broken down into amino acids which are then taken up by your body and used to build new *Maisy* proteins for your own cells.

Maisy, with wide eyes: So fish and bean proteins become my proteins?

Mummy: Exactly! Now here's the wild part: those amino acids might be really old. Some might have just been made by a plant yesterday. But others might have been recycled repeatedly by different creatures over millions of years. Imagine an amino acid of a protein that started in a tiny sea creature a hundred years ago, got passed along through microbes, fish, and other animals, and finally ended up in a protein of the egg in your lunch sandwich!

If we go even further—to the tiniest level—we get to atoms. Atoms are the building blocks of everything. One of the most common atoms in your body is hydrogen, which is part of water. Our bodies are mostly water, which is why we get terribly thirsty on a hot day when we don't drink enough. Most of the hydrogen in your body was made just after the Big Bang, about 13.7 billion years ago. That means some parts of you are older than Earth itself!

Maisy, with wider eyes: WOW!

Mummy: So: to return to the question *How Old Are You?* You're as old as the number of candles on the cake of your last birthday party. But you are also as young as your newest cells, and as old as the atoms that have been around since the beginning of the universe. Your body is a mix of

A learner-centric microbiology education framework

moments and millennia—a living, breathing story made of recycled parts from across time and space.