EXPLODAPEDIA

Welcome to *Explodapedia*, the indispensable guide to everything you need to know!
This series is packed with in-depth knowledge you can trust; it gives you the tools you need to understand the science behind the wonders of our world. Read on to discover the story of how we became the way we are, in *Evolution* . . .

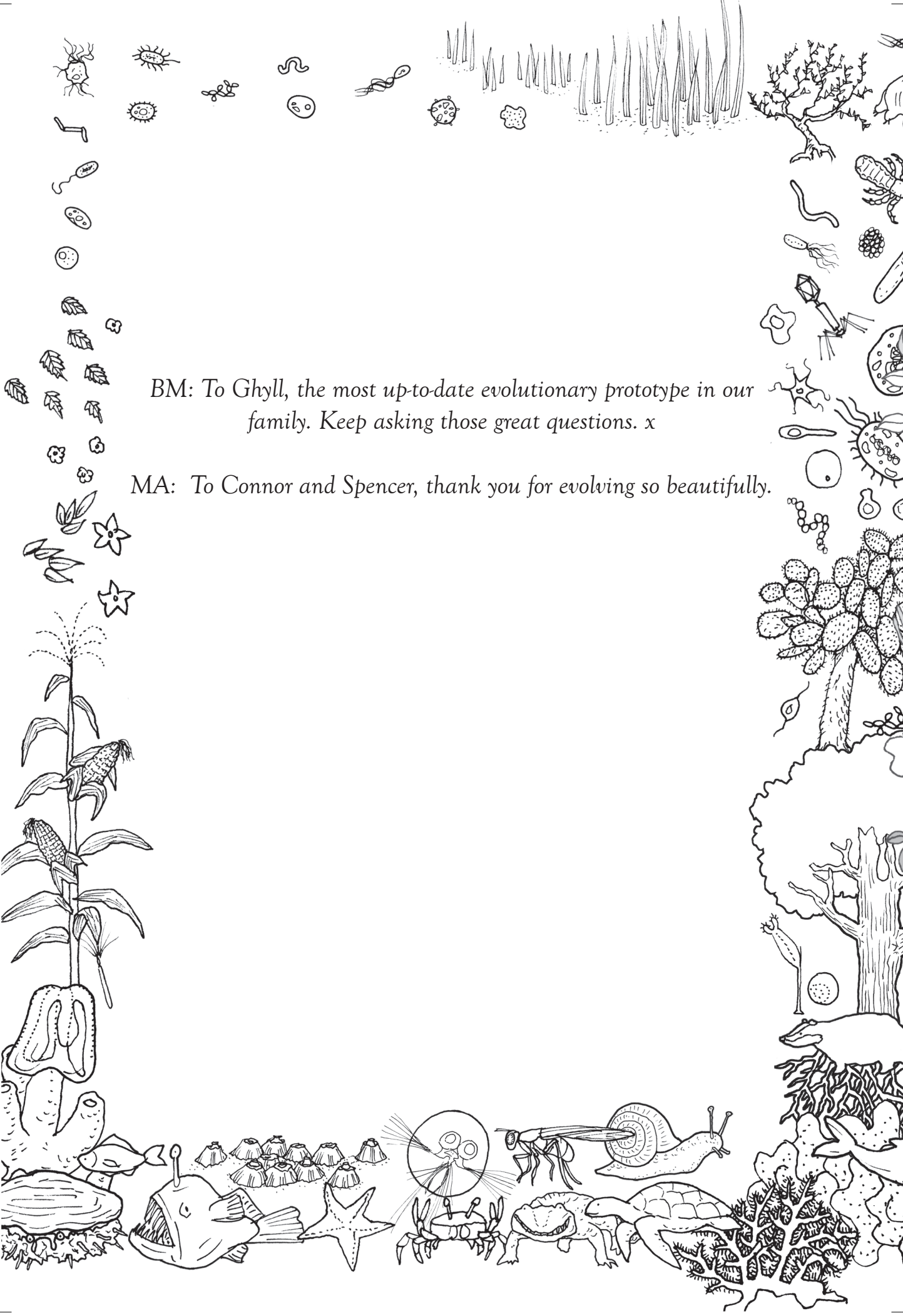
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BM: To Ghyll, the most up-to-date evolutionary prototype in our family. Keep asking those great questions. x

MA: To Connor and Spencer, thank you for evolving so beautifully.

EXPLODAPEDIA

EVOLUTION

How We Came To Be

Ben Martynoga

Illustrated by

Moose Allain

FICKLING

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Consider the Fly

What's the point of flies? They're annoying. They buzz. And, of course, they hang out in the most disgusting filth – then come and land smack bang in the middle of your dinner.



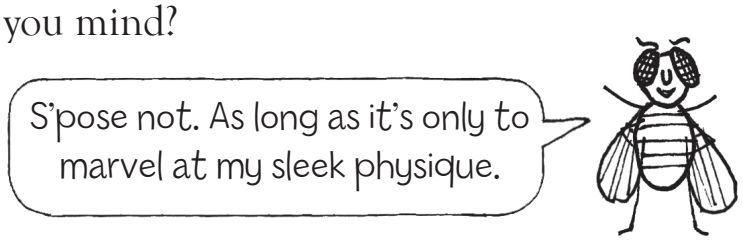
Oh, great. Here's a fly now. Get lost!



A **talking** fly?! Go on, zip it, or you're getting squashed.

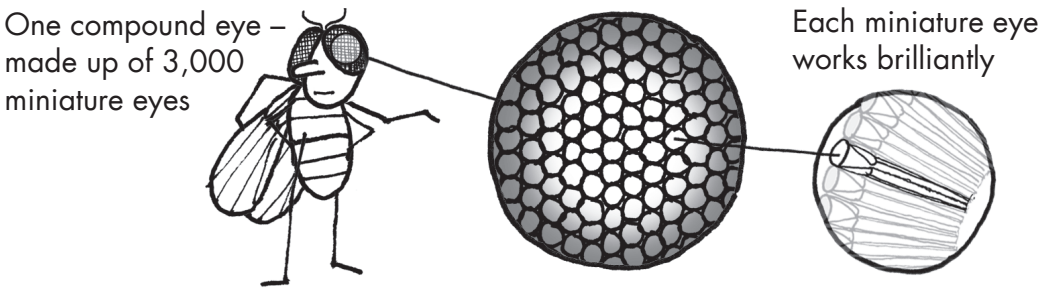


OK, OK, you're right. You flies **are** practically impossible to swat. And, actually, what we really want to do is take a closer look at you. Do you mind?



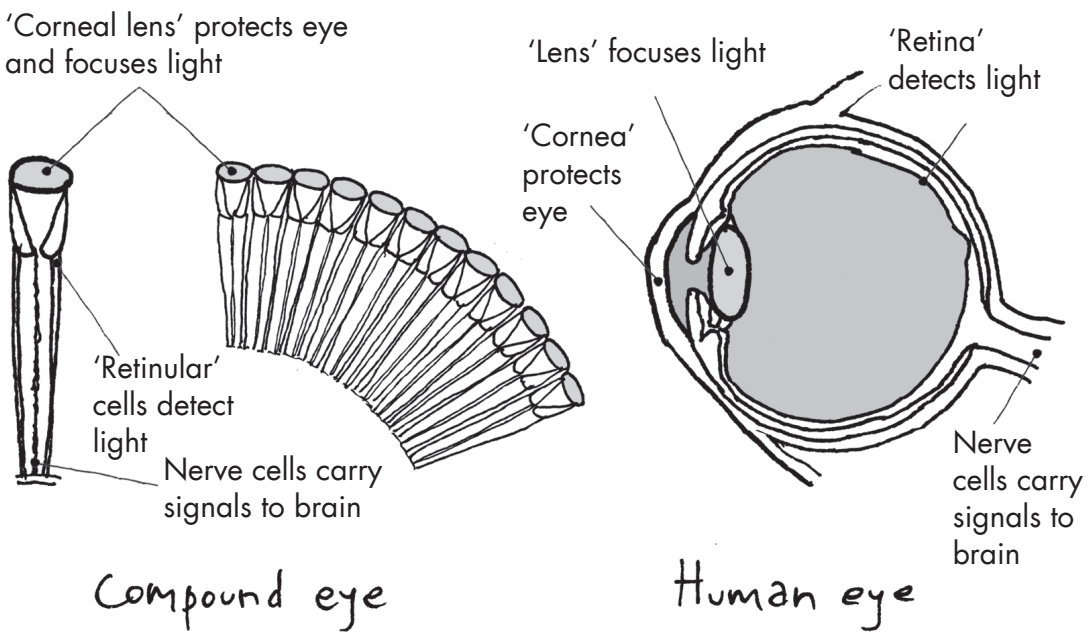
Why You'll Never Catch a Housefly with Your Bare Hand

First, let's check out those eyes. They might look fairly ordinary at first, but they're actually two compound eyes:

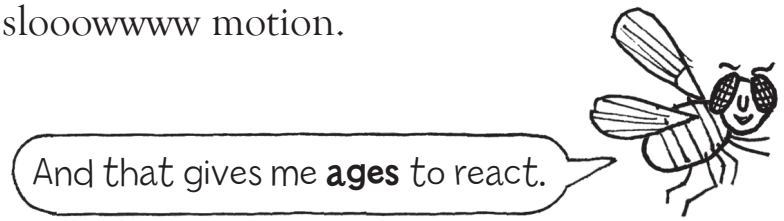


That's why flies can see what's going on all around them – and see **you** coming a mile off.

Just like the cells in the *retinas* at the backs of your eyes, cells in a fly's compound eyes contain tiny, highly sensitive detectors made from proteins, which convert light into electricity. When the fly 'sees' something – like a rolled-up newspaper rushing towards it – those electrical signals zip along nerve-*cell* 'wires' and into the brain, which decides what to do about the threat.

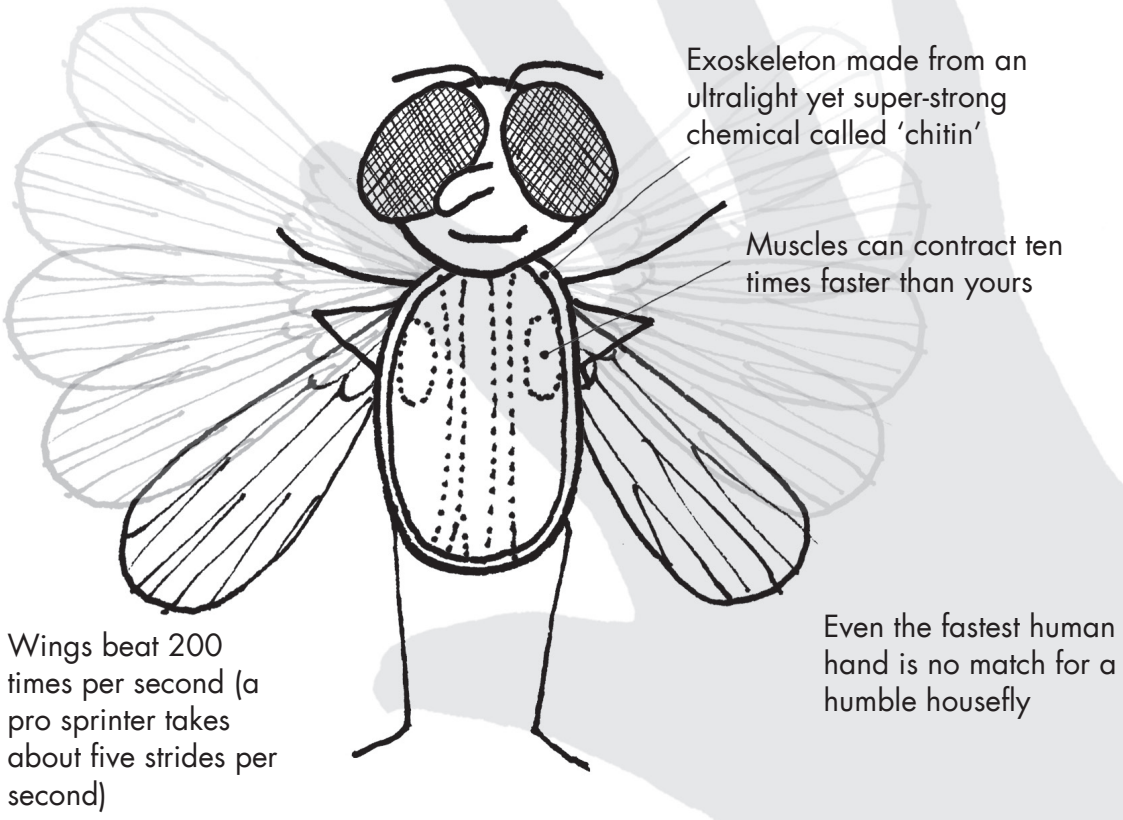


But all this happens extremely quickly. Flies process visual information **seven times faster** than you do. From a fly's point of view, each tick of a clock's second hand feels like it takes seven whole seconds. So, to a fly, we humans look like we're moving in slooowwww motion.



Which is why flies always seem to . . . **fly** off, extremely quickly.

Also, for their size, flies are vastly stronger than we are. Because they have an *exoskeleton*, which basically means a skeleton on the **outside** of their bodies, they can pack more muscle power **inside** their bodies.





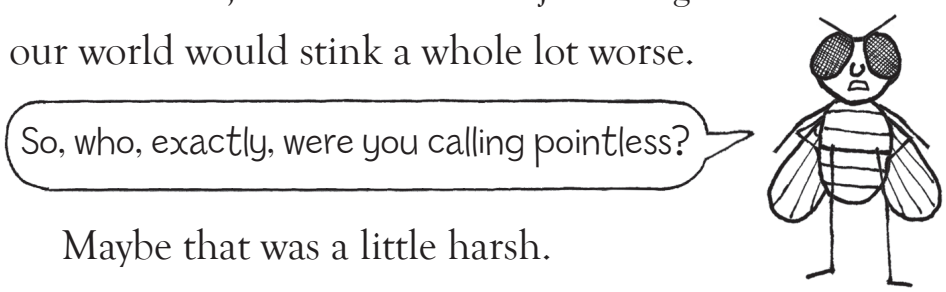
Fair point!

Next time you spot a fly, watch it for a moment. You'll see it wiping itself down with its front legs. Flies rely on their senses. They use chemical sensors embedded in their legs to 'taste' their world – constantly. If they don't keep those sensors, as well as their compound eyes, nice and clean, they'll get lost and confused.

And, actually, it's worth knowing that if flies –



– didn't join forces with all the other *detritus*-eating beasties that gobble up and recycle dead and decaying waste, that waste would just hang around for ever. And our world would stink a whole lot worse.



Maybe that was a little harsh.

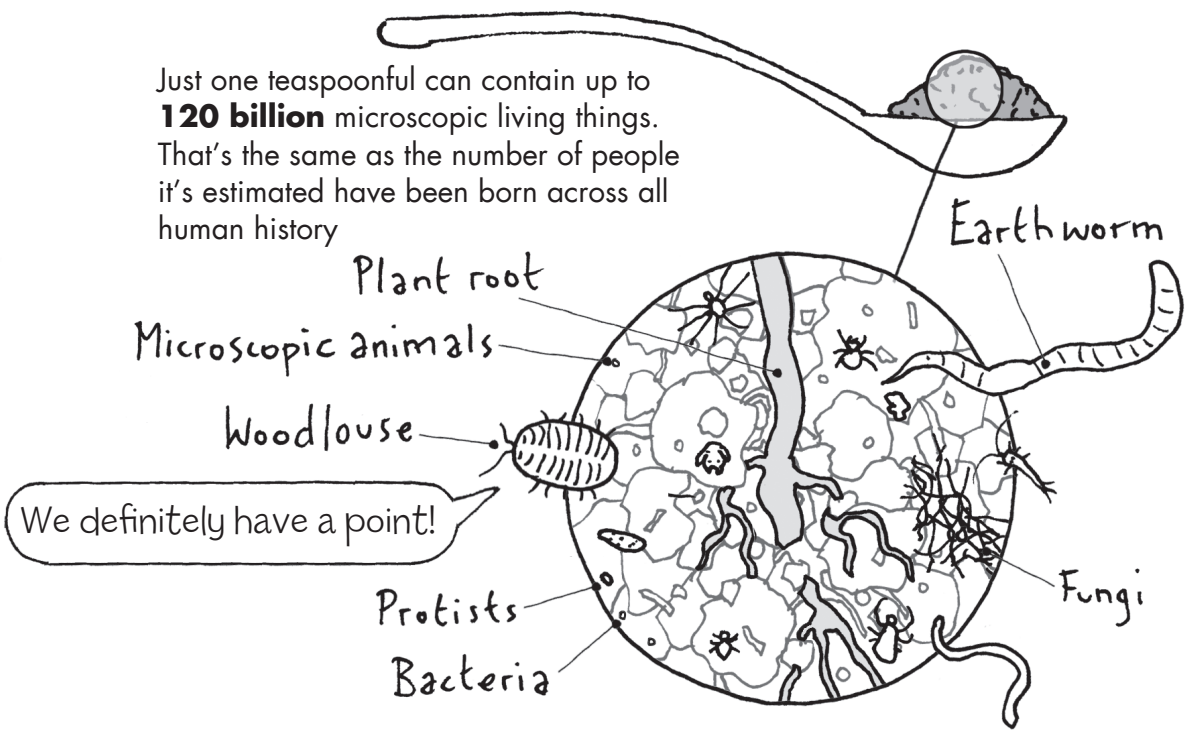
Take a proper look at any living thing and you'll find that

it's amazingly well-suited to its surroundings. Its body parts seem tailor-made to do all the work needed to keep it alive and able to multiply itself, whenever it gets a chance.

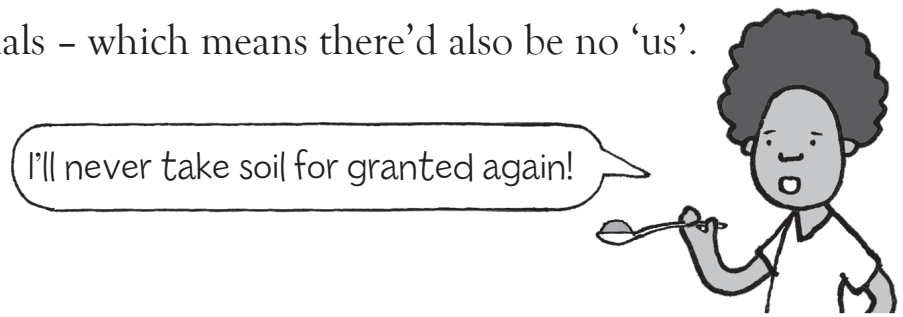
Think about the grass in your local park that's constantly being mowed, nibbled, scuffed, stomped and peed on. It just keeps on growing back. Incredible, eh? And all it needs to stay alive is a bit of sunlight, the occasional splash of rain and a thin layer of soil.



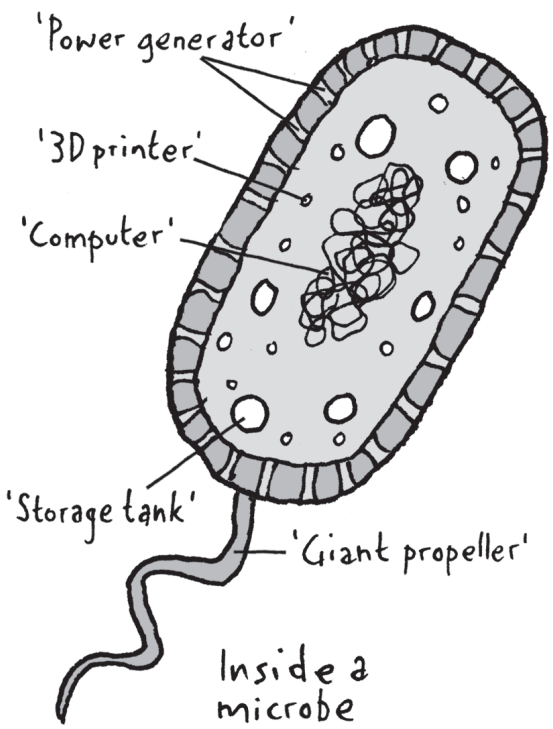
That soil is even more amazing.



They absolutely do. These minute underground creatures are utterly crucial. Without them there'd be no soil. And without soil there'd be no plants and, therefore, no plant-eating animals – which means there'd also be no 'us'.

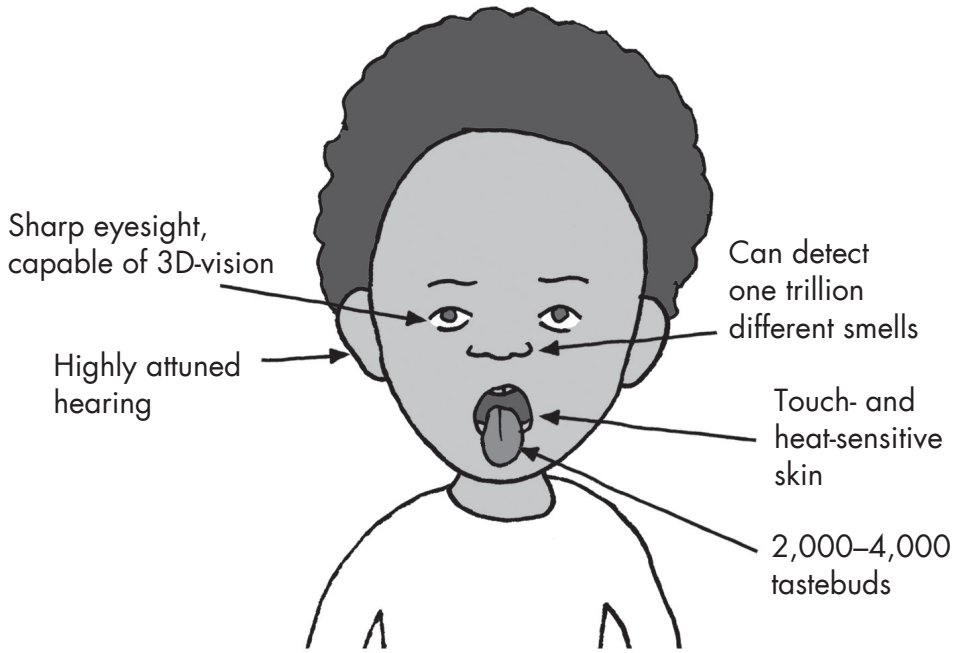


If you could peer into the minuscule bodies of those soil *microbes*, your mind would be truly boggled. You'd see thousands of intricate, *molecule*-sized machines, all working away 24/7. Together, they perform the elaborate chemical reactions needed to break down the waste other living things leave behind, keep themselves going and make the fertile soils plants need. Though these microbes are tinier than the smallest specks of dust, their moving parts all look every bit as carefully constructed as the much larger bodies of plants and animals.

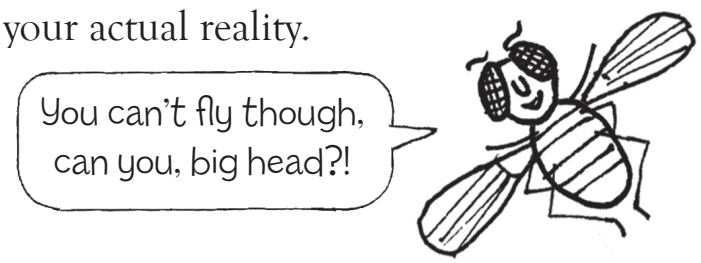


Now look in the mirror. Whether or not you like what you see, there's no denying that the human head is fitted

with some impressive equipment. Most of us are lucky enough to have a set of hungry sense organs, which are constantly gobbling up information about the world around us.

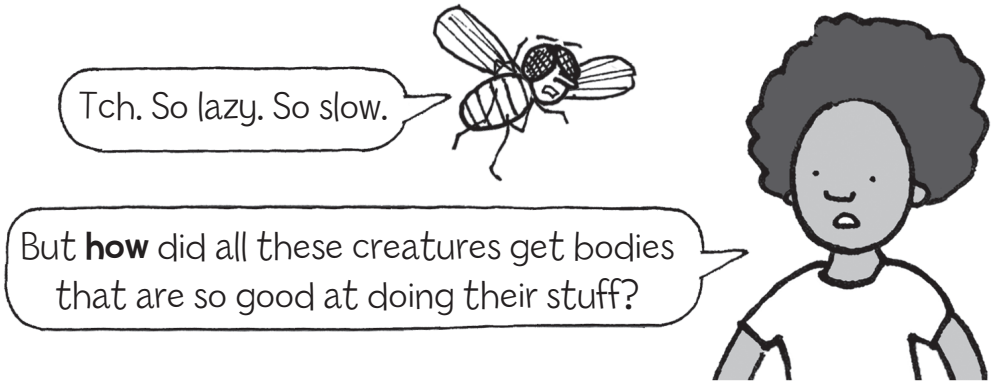


And in between those ears is a brain that's more than a match for any manmade supercomputer. It uses all that sense information to livestream the most addictive, fully immersive, multi-sensory virtual reality computer game ever. Only it's not virtual reality, it's your actual reality.



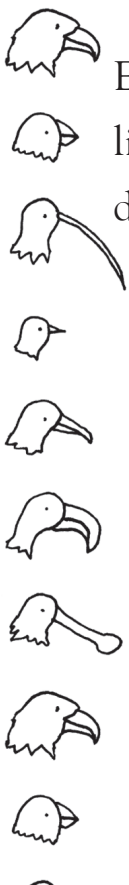
OK, so we don't have wings. But that's exactly the point: different bodies are purpose-built for life in different *environments*. It doesn't make any sense to say that some bodies

are better than others. And, besides, we don't need wings. Thanks to our brains, we can fly . . . in aeroplanes.



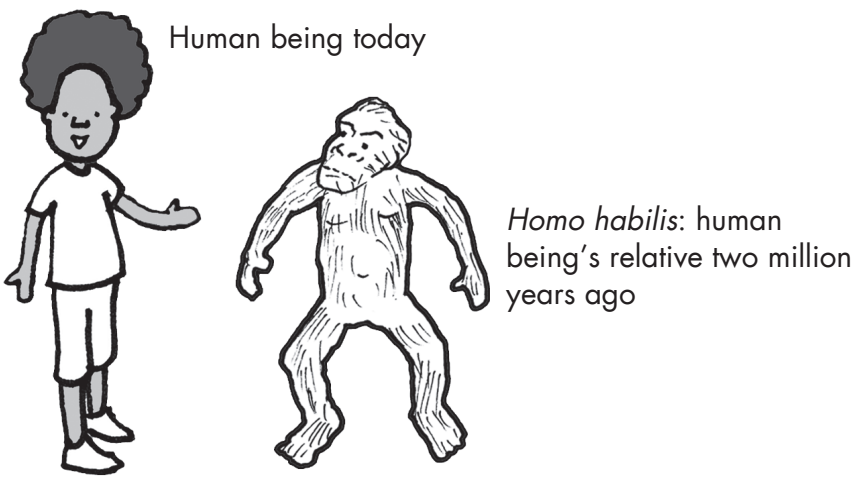
That's a question people have been pondering for as long as they've been able to ponder. We're lucky enough to live in an age where we **know** the answer.

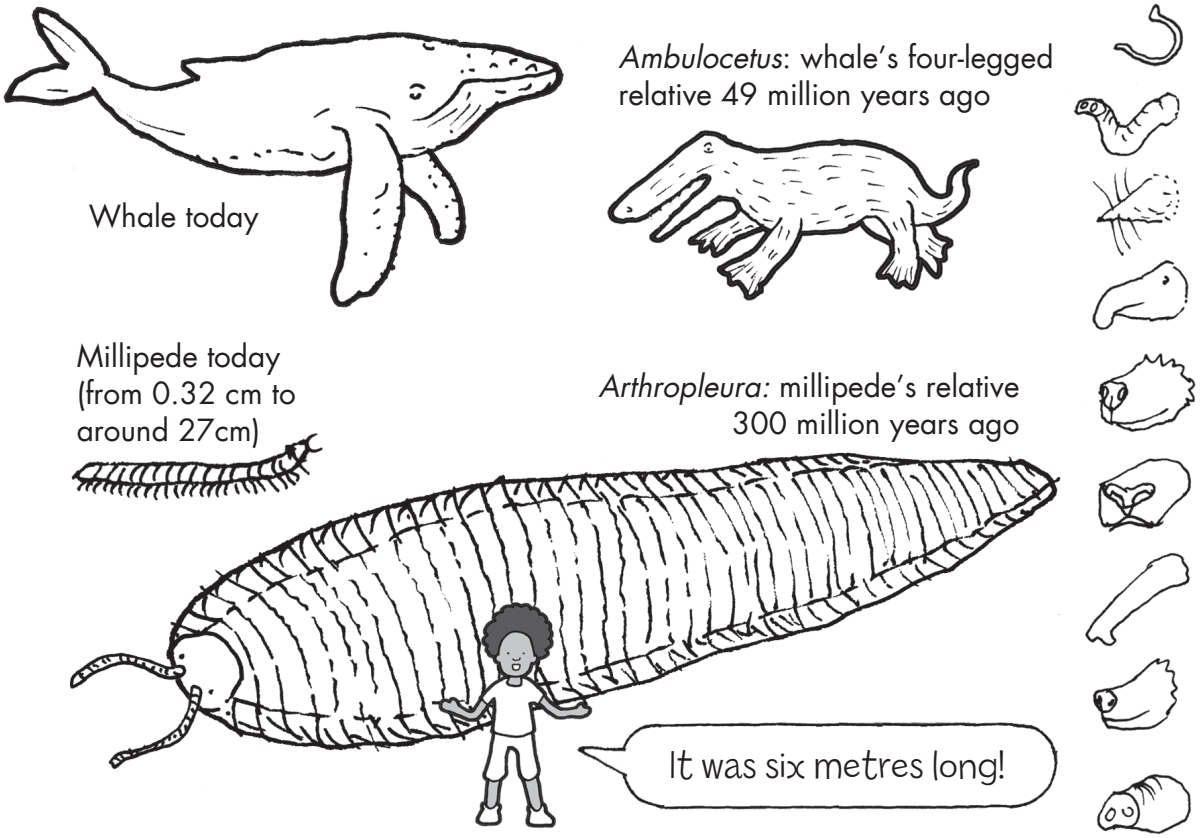
Here's what it boils down to: all living things have been carefully crafted, over aeons of time, by the extraordinary, and often incredibly creative, process we call *evolution*!



The Planet-Sized Innovation Lab

Evolution basically means 'gradual change'. So, when we say a living thing has evolved, we mean it is a modified version of a different living thing that existed in the past.



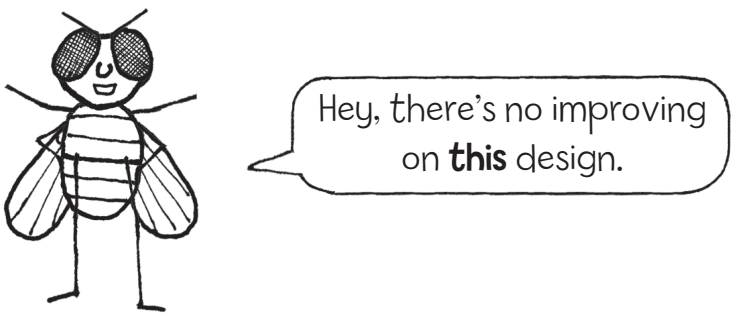


Evolution modifies living things through a never-ending process of 'trial and error'. In each new generation, some *organisms* grow and behave in ways that differ slightly from their parents. Some of these differences make creatures' lives harder. But successful ones produce individuals that are better at surviving and reproducing within their particular surroundings. Over many, many generations, success has built on success, gradually creating all the different creatures that creep, swarm, sprout, spread, ooze, bloom, squawk, flap and buzz across every corner of our planet.

Evolution has been running these 'experiments' for an eye-wateringly massive amount of time. In fact, biologists now know for certain that all *species* around right now are related

to the very first **living things** that spluttered into life on our planet back in the deep shadows of time. That means they've **all** been evolving for around **four billion** years!

Life has had its ups and downs, however. On several occasions things got so bad that it was almost **snuffed out** entirely. But some living things have always found a way to persevere and, thanks to evolution, adapt themselves to their new circumstances whenever the world has changed. That's why you can actually think of today's life forms – including you – as the most up-to-date prototypes to have emerged from a planet-sized innovation lab. It's a lab that has been tinkering with its designs, non-stop, for thousands of millions of years.



We're all works in progress, actually, Fly. Your type of body will gradually be altered. And future flies might even evolve into something that isn't a fly at all. That's evolution for you – everything that's alive is, and always will be, in a state of change. Now, sit tight, because we're about to find out how it actually happens.