Nature Selecting

A children's book explaining evolution

By Prosanta Chakrabarty, PhD

Illustrated by Anjali C. Noël

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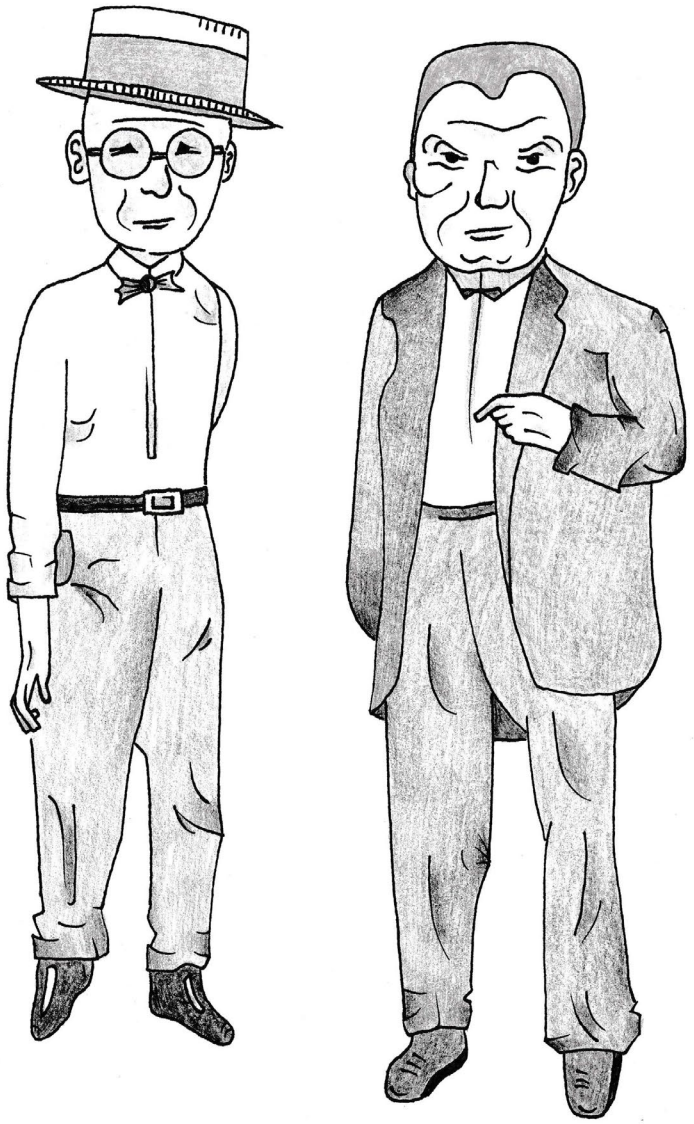
Dedication

To all those who defend the teaching of science and evolution and in memory of Clarence Darrow (pictured right) and John T. Scopes (left) on the 100th anniversary of the ‘Scopes Monkey Trial’ in Dayton, Tennessee.



This is Nat. She loves animals and studying them, so she wants to be a zoologist when she grows up (because that's what they do). She especially loves fishes.*

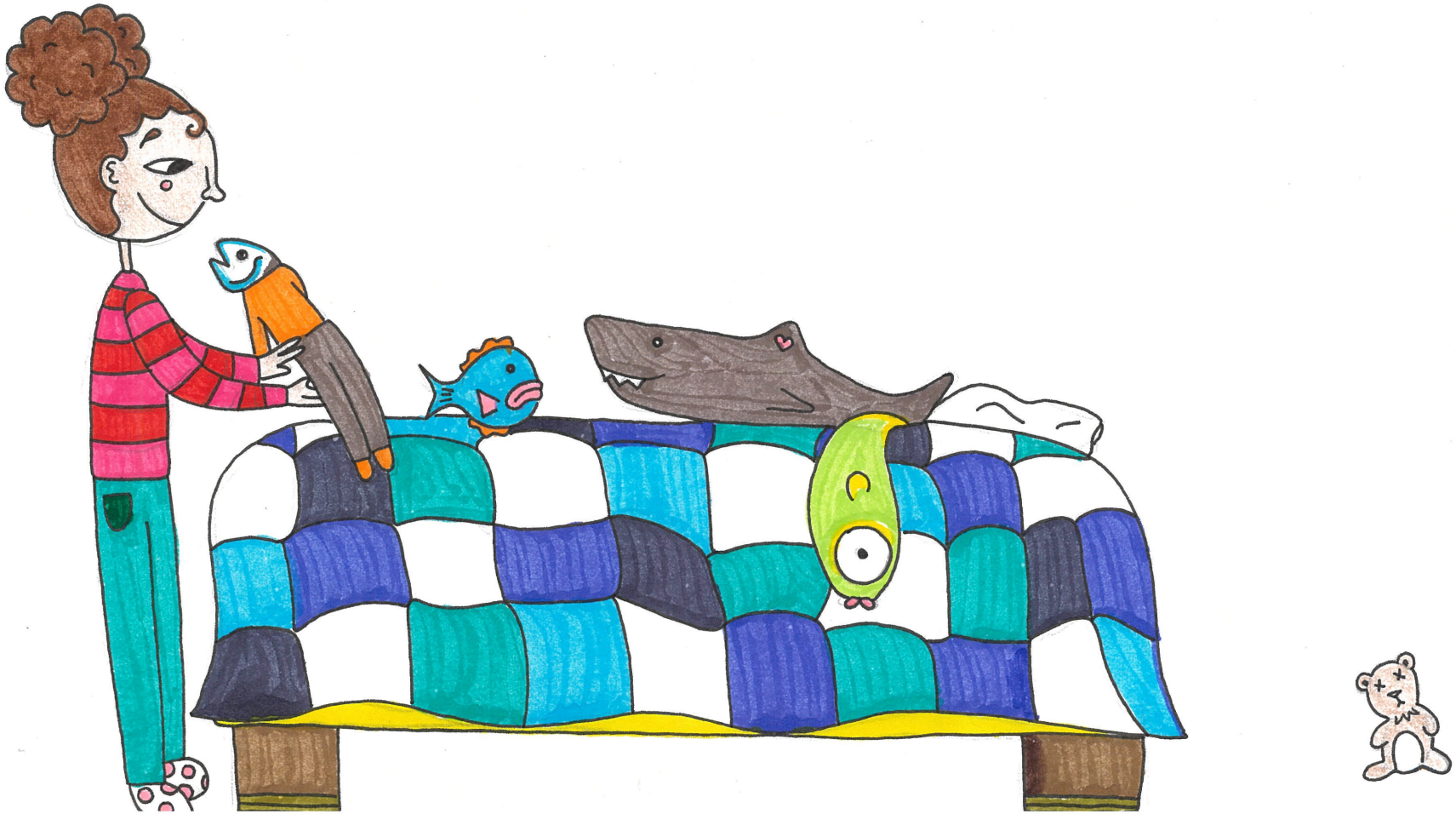
*Yes, it's 'fishes' when you mean more than one kind!

Nat loves her toy animals, but she has so many of them that her mom told her she needs to give some away.

How will Nat select which ones she will keep?

Nat decides she will select those that best fit the different parts of her room. The polar bear goes on the white chair where it can be camouflaged, and the penguin will go near the fan where it can stay cool. The camel and the snake will go underneath the lamp so they can be warm.

Nat’s beloved fish toys all go on the blue comforter on her bed. Especially her favorite, Mr. FishPatrick.

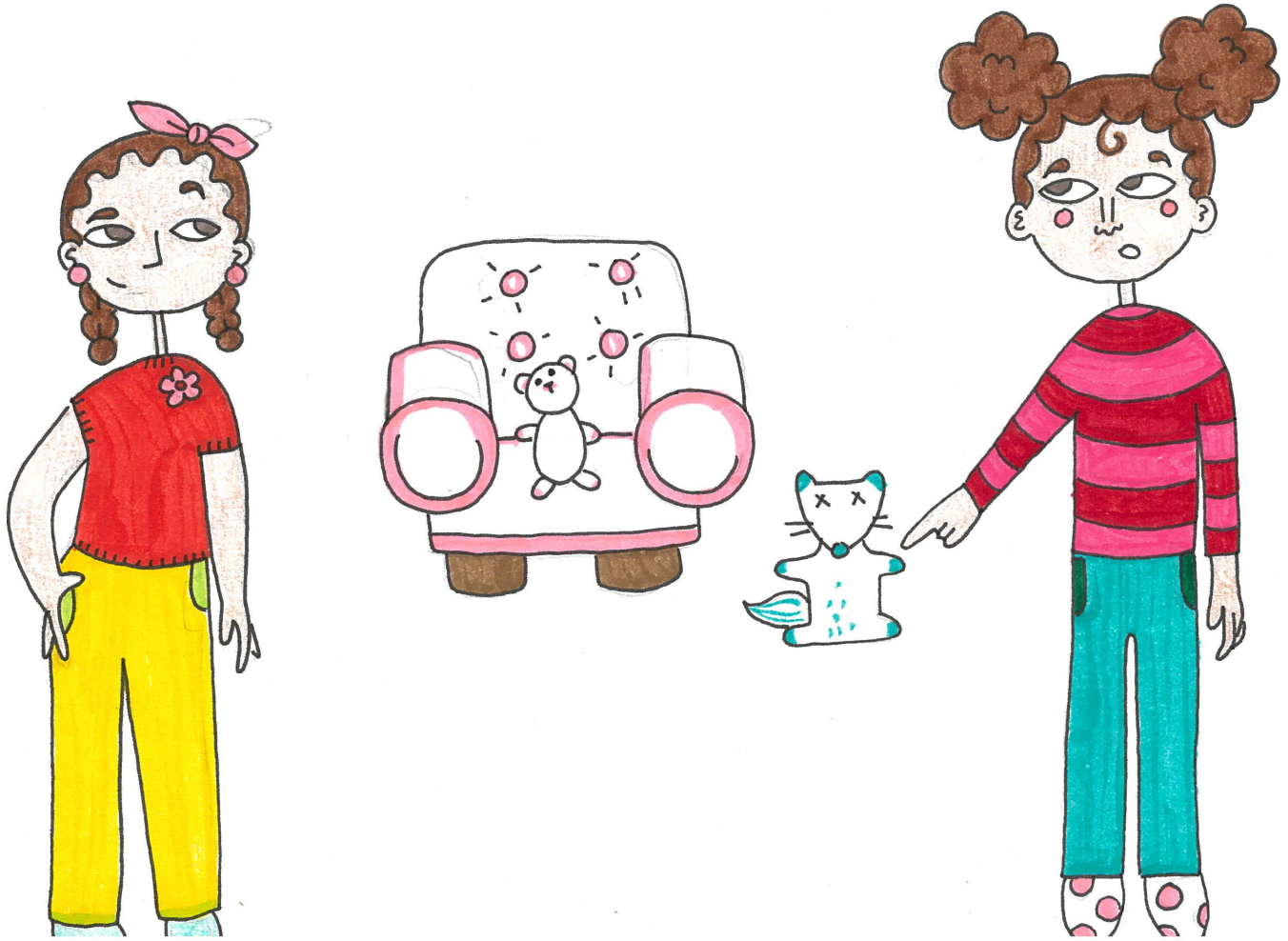


But she still needs to pick the stuffed animals to give away!

Nat’s mom comes to her room and says, ‘Good job on cleaning up dear, but where are the toys you are giving up?’

‘Well mom, I have a few older stuffed animals that don’t look too good because our pets have chewed them up. I guess they are extinct now.’

‘This arctic fox used to live with the polar bear, but there isn’t any more room on the white chair for both of them to survive: so, I guess it has to go’



‘That’s a good start dear, but I still think you have too many toys in here. How about you just keep the fish toys but get rid of the rest, like these stuffed monkeys?’

‘Come on mom, we have a gorilla, an orangutan and a chimp – which are apes not monkeys! These are our closest living animal relatives!’

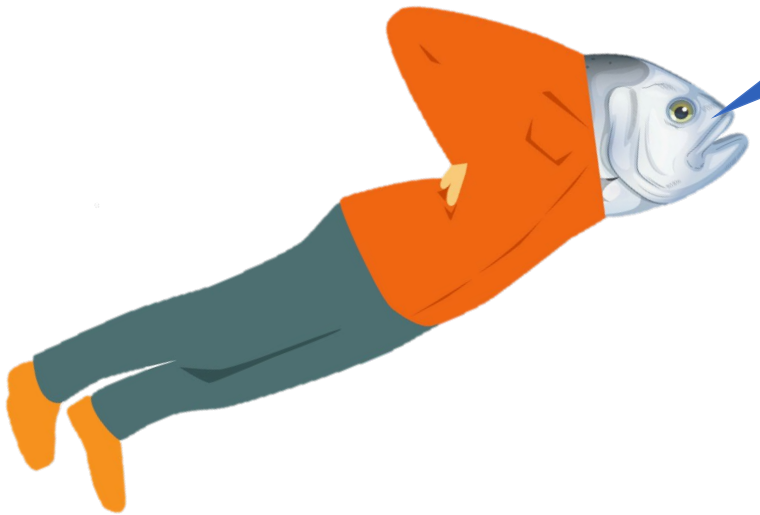
Mom: ‘Now Nat, you know I’m a judge not a zoologist. How about you just keep all your favorite fish toys, and get rid of the rest okay? You can try again tomorrow.’

She plants a goodnight kiss on Nat.

That night, cuddled up with all her fish toys, Nat drifted off to sleep. Her mind was swirling with thoughts of fishes and fossils.

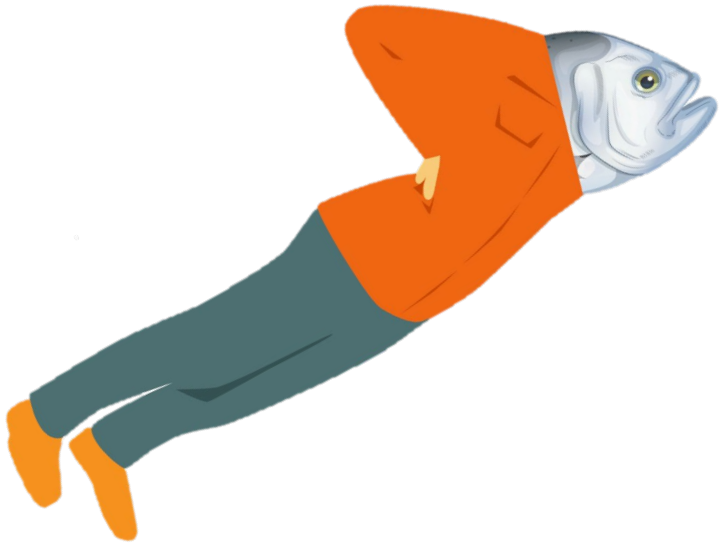
She had the strangest dream …

‘Hi Nat – it’s me Mr. FishPatrick’



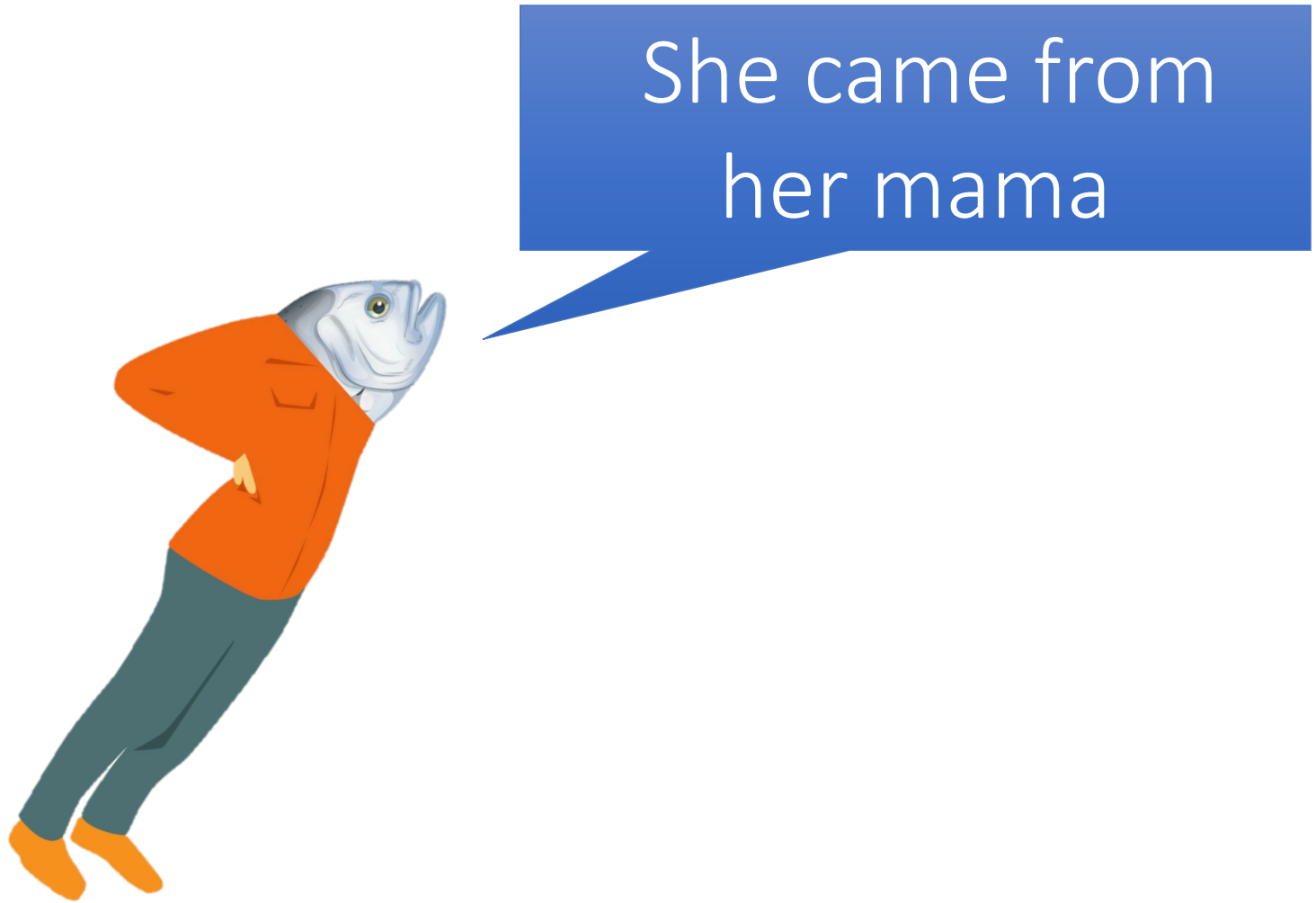
Nat asks: ‘Where did we come from Mr. FishPatrick?’

‘I know *you* came from the ocean – you are a fish man – but where did we human children come from?’

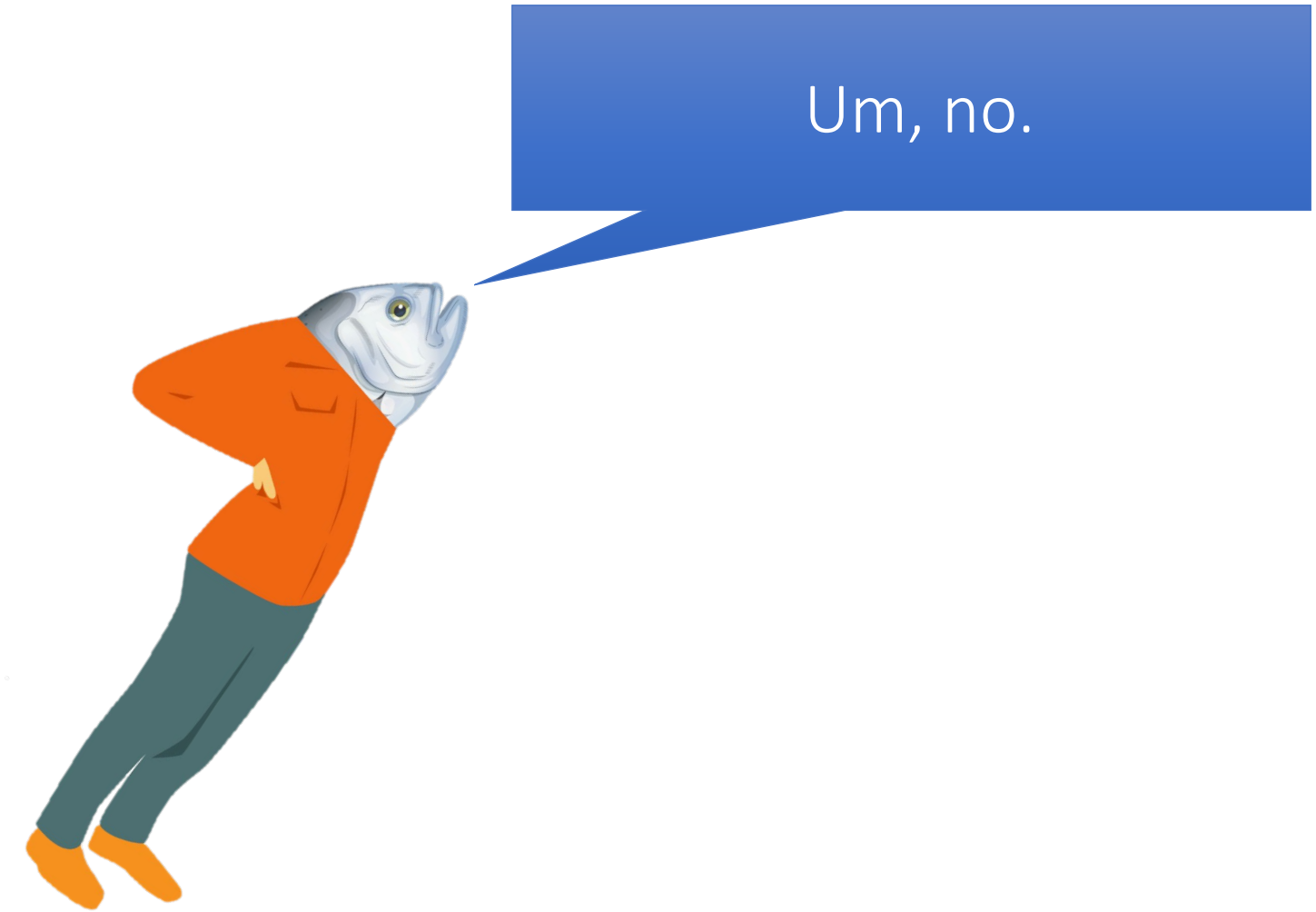


You came from your mama

‘Where did she come from?’

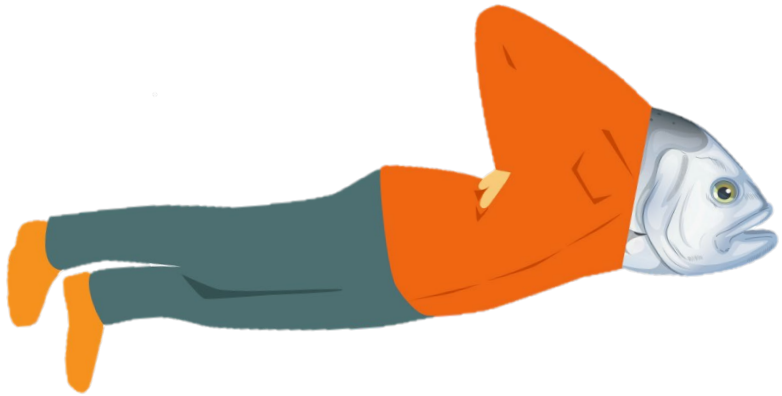


Did she live in the ocean?



‘So how come you said we all came from the ocean?’

Listen kid, a long, long time ago, many, many generations ago, your ancestors were fish.
And technically … you are still a fish.



Narrator: Maybe don’t talk to men with fish heads kids…..

‘What are you talking about Mr. FishPatrick?
You got fish brains?’

You got fish brains too. And a fish backbone, and eyes, and teeth, and almost everything about you is modified from your fishy ancestors from the ocean.

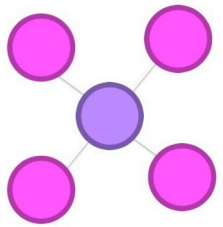
You see, all life on Earth is connected by **evolution**. Evolution is the change in life forms over time.

‘Take me back to the beginning fish face!’

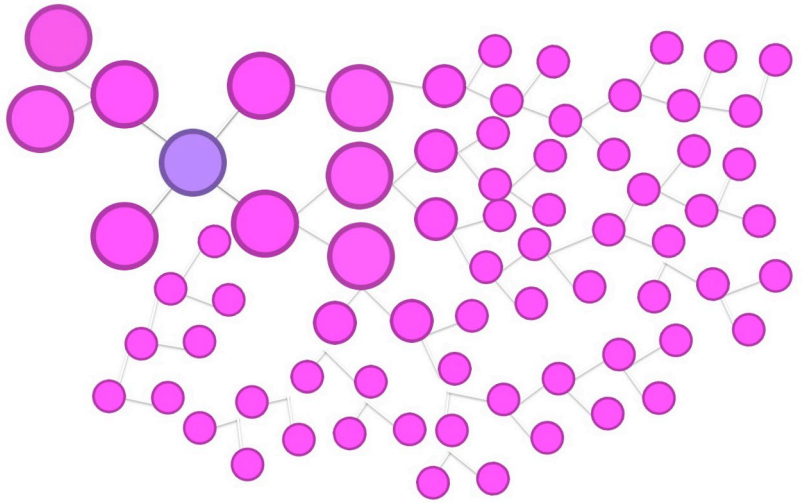
Sure thing air breather!

Single-celled life formed on Earth about 4 billion years ago.

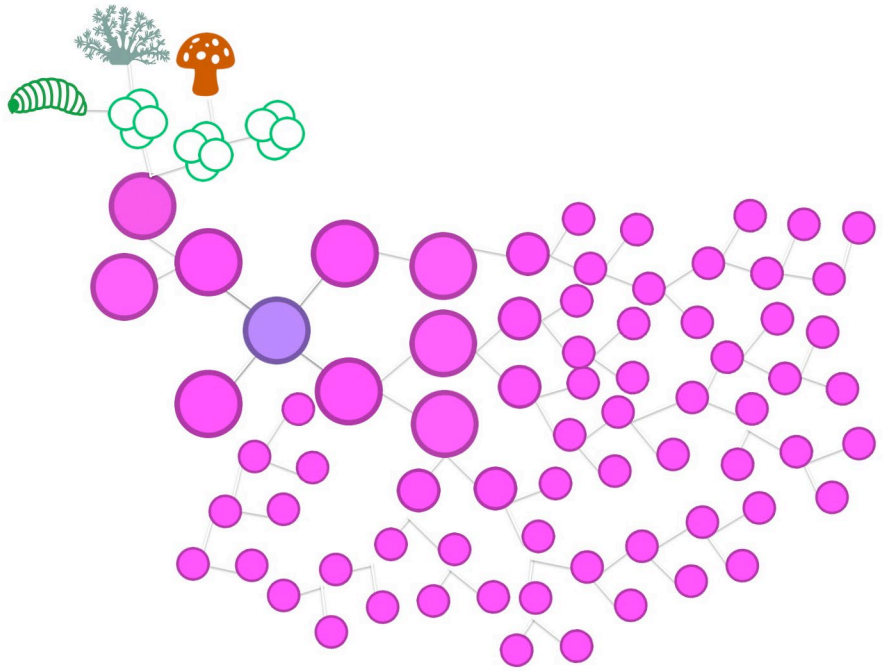
It turned into other kinds of single-celled life.



In fact most of life on Earth today are different kinds of single-celled organisms, like bacteria.

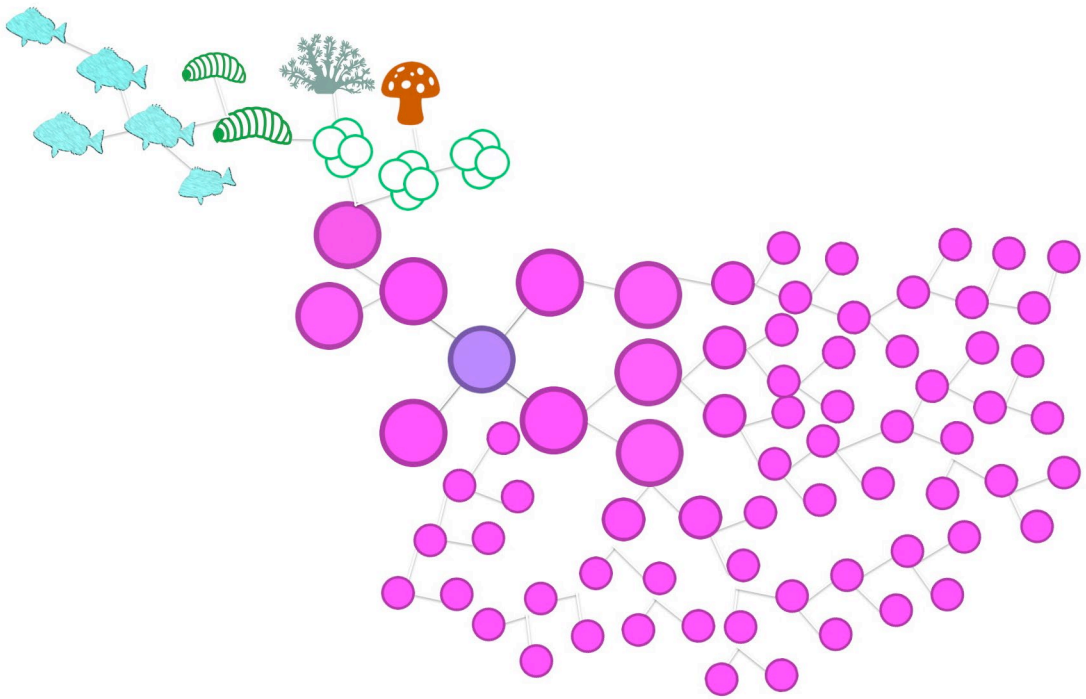


About 3 billion years ago you start getting multicellular life* that will eventually become things like mushrooms, plants and animals.

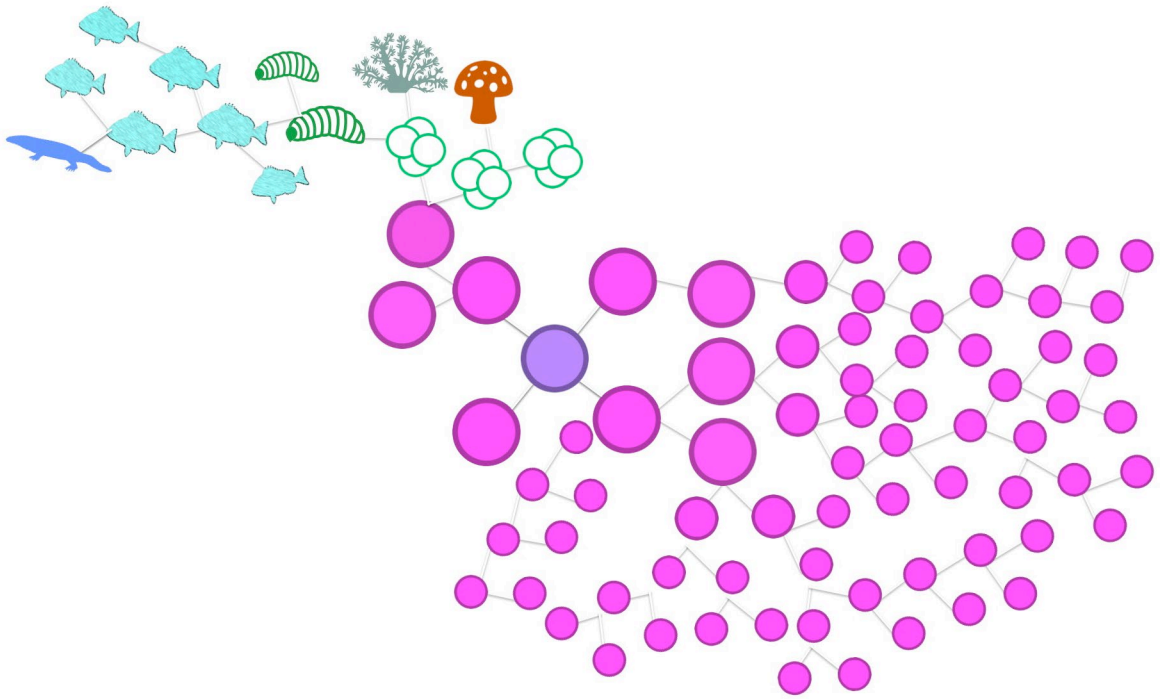


*Organisms made up of more than one cell; all multicellular organisms are part of the ‘Eukaryote’ domain of life.

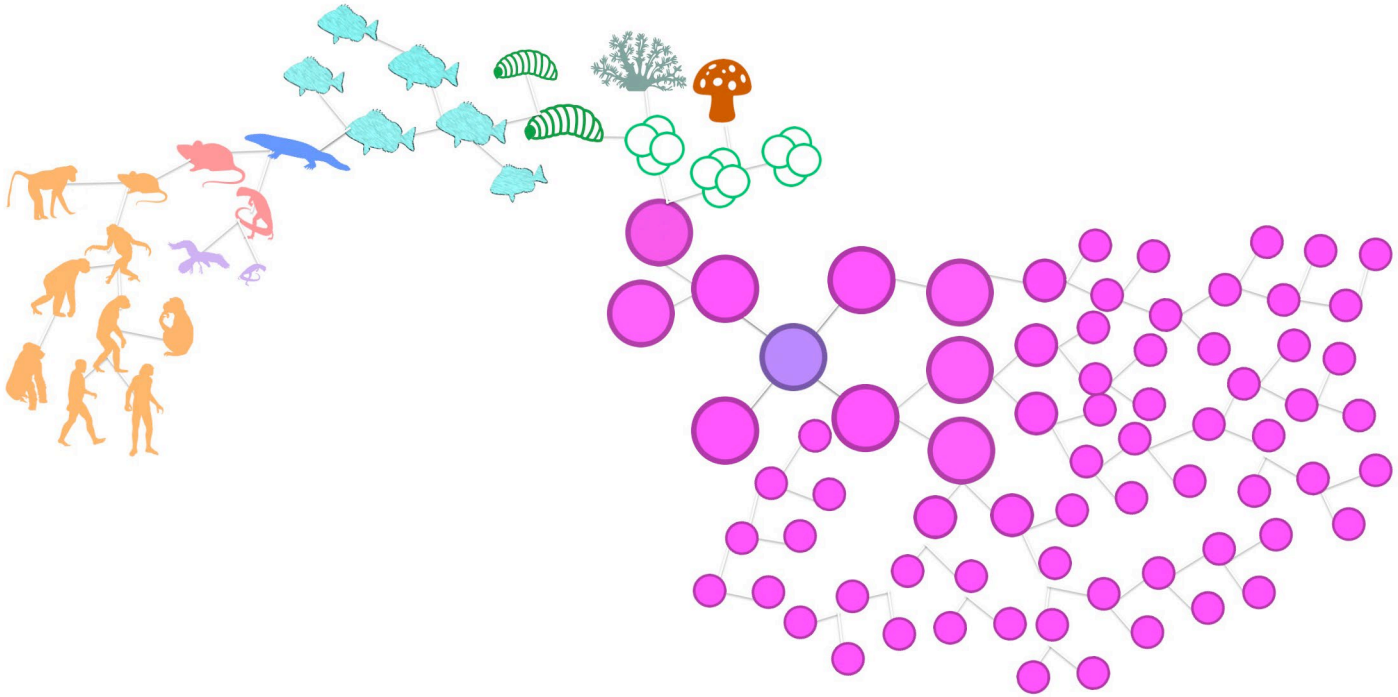
The first animals with a backbone were fishes. So all animals with a backbone (**Vertebrates**) are fishes! Including you and me. Told ya!



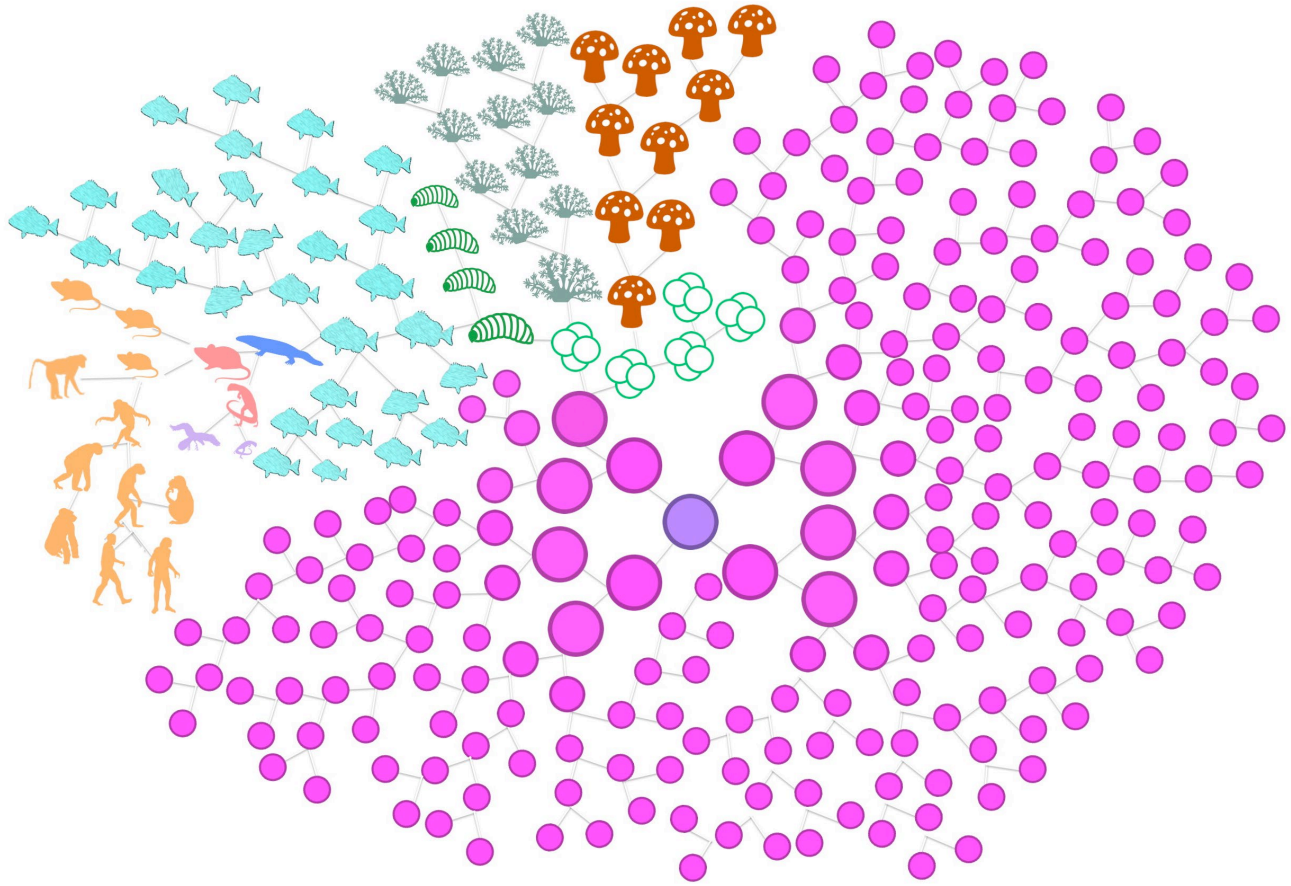
One group of fish came on to land and stayed there. Their bodies were adapted to fight gravity out of the water and breathe air.



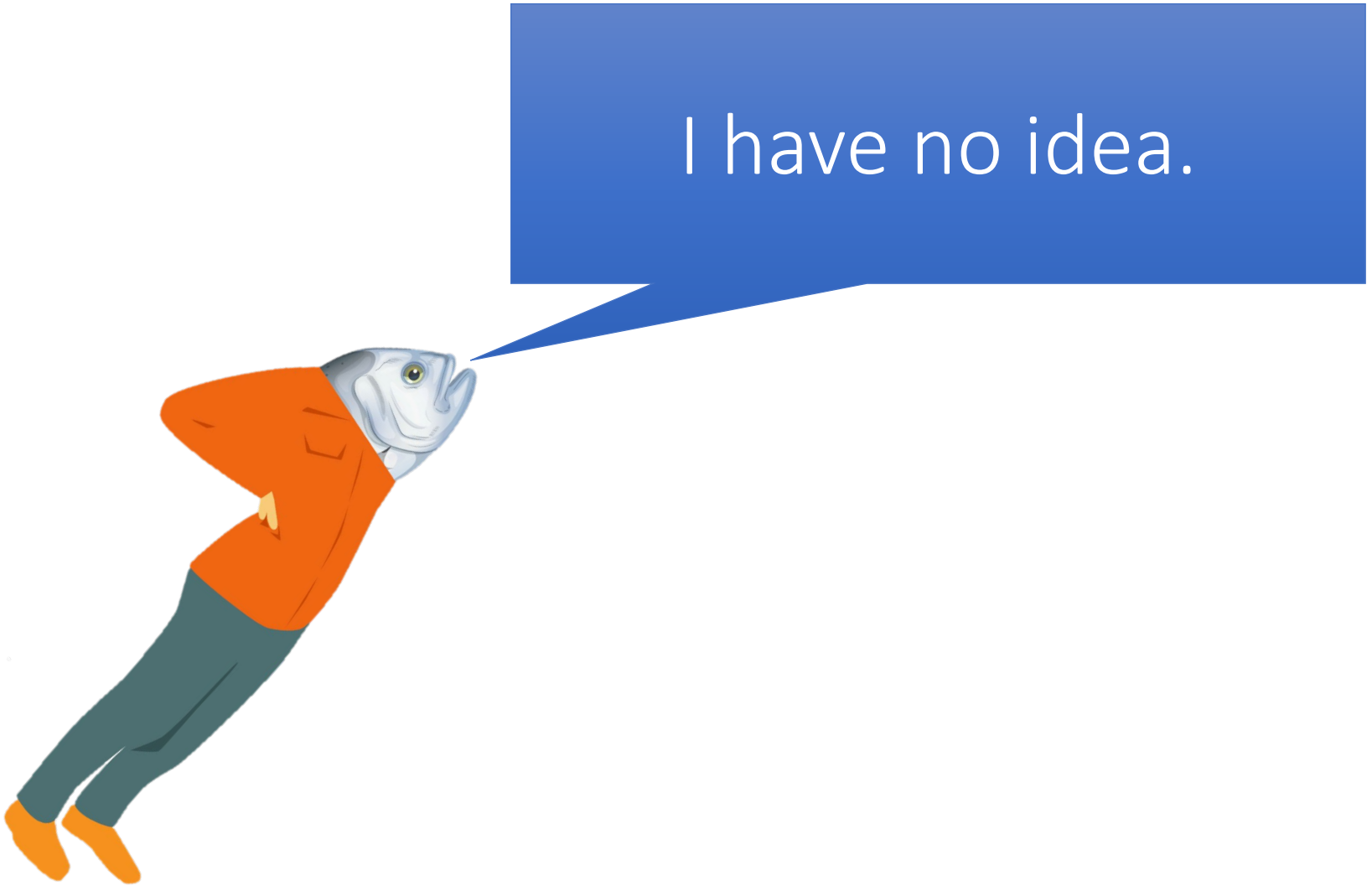
From the first fishes that came on land came all reptiles and mammals. Birds are reptiles, and you are a mammal – that's why you have a belly button and love milk and your mom.



So you see - all life came from one another. You are an ape and a mammal, but also a fish, and an animal, and a multicellular organism etc., all the way back to the **shared common ancestor** of all life on Earth.



‘Okay, but why do you have a fish head?’



Nat woke up with a plan.

She told her mom she would select toys that belong to just one group of organisms: As her mom had suggested, that would be the fishes!

‘Well Nat, it looks like you have just as many toy animals here as you did yesterday.’

Nat: ‘Yes mom, but they are all fishes.’

‘Oh really, even the monkeys, I mean apes over here, even the people dolls?’, asked her mom.

‘Yes mom, and I’ll prove it to you', said Nat.
‘Let’s have a monkey trial.’

Nat picked up her Mr. FishPatrick doll and explained to her mom all the points from her dream … and concluded, ‘All animals with a backbone are technically fish, mom, even these apes, even us!

Our fishy ancestors are why we have teeth and jaws, a brain in our skull and even arms and legs! Just imagine if we evolved from something else, like an octopus: eight arms, no thank you!’

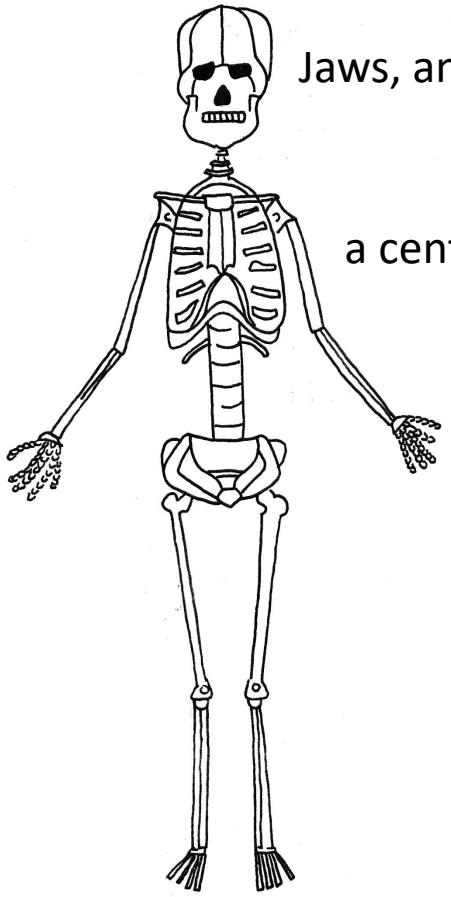
‘Oh boy. You are a regular **Clarence Darrow** my dear, I’ll have to tell you about him one day. But for now, you have won me over and you can keep all your toy fish.’

‘It’s ‘*fishes*’ mom!’ They both had a good laugh.

Glossary

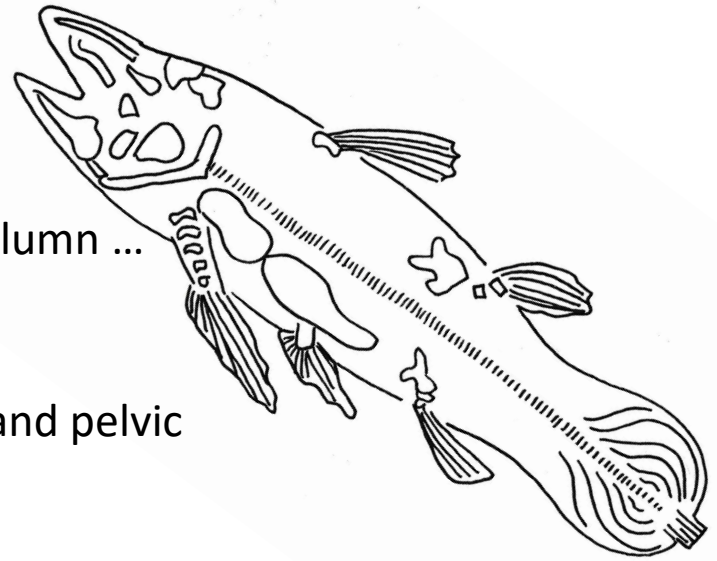
- **Clarence Darrow** – a lawyer who eloquently defended the teaching of evolution in the famous 1925 Scopes ‘Monkey Trial’
- **Evolution** – The scientific explanation for the diversity and origins of life. The process of evolution includes natural selection (like Nat uses in this story).
- **Shared common ancestor** – the ancestor from which all life on Earth descended
- **Vertebrates** – animals with a ‘backbone’ technically know as a ‘vertebral column.’ The first vertebrates were fishes, so one way to think about it is to call all of their descendants, including land dwelling animals like us humans, ‘fishes.’
- **Zoologist** – someone who studies animals

Our anatomy has fishy origins



Jaws, and other bones of the skull/cranium, teeth …

a centralized brain and nervous system, vertebral column …



Our arms and legs evolved from the pectoral and pelvic fins of our fishy ancestors too.

Many of our anatomical features first evolved in our aquatic vertebrate ancestors (which were fishes). When some fishes adapted to live on land their anatomy evolved and was shaped by natural selection to help them survive on land. These land-adapted fishes ultimately gave rise to amphibians, reptiles (including birds), and mammals like us! (And technically you can still consider all vertebrates, including those that live on land, like us, fishes!)

Acknowledgments

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About The Author and Illustrator

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Anjali Noël is Prosanta's 14-year old daughter who just graduated from Sherwood Middle School in Baton Rouge, Louisiana.

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