

# The Scientific Theory of LIFE on EARTH

GEOLOGICAL TIME-SCALES

MASS EXTINCTIONS

FOSSILS



# WHAT IS A THEORY?



If anybody studies the evidence of what has happened, and then suggests what might have caused it, he is putting across his **theory**.

Until it is **PROVED** right or wrong, it remains a **Theory**. It will be tested at all times to see if new evidence still supports it – even if it passes this test, it just means that it is still not proved wrong, and may still be a possible explanation.

All **religions** have their **Theories** of how it all happened. They cannot prove that they are right, but no tests can prove that they are wrong. So all religions tolerate each other, and everyone has a right to their own religious beliefs.

**Scientists** have looked at the same evidence, and have suggested their theories as well. Not aiming to contradict religions, but to also add their suggestions to the mix. Like in religions, the evidence **supports** what they claim, and no evidence has been found to **prove** that they are wrong.

# SOME DETAILS of the SCIENTIFIC THEORY

- The planet Earth was formed 5 000 000 000 years ago. (This is 5 billion years ago. Or **5 bya.**) Or 5 000 mya.
- Any form of aquatic life only started 3 500 000 000 years ago. (This is 3,5 billion years ago. Or **3,5 bya.**) Or 3 500 mya.
- 500 000 000 years ago (**500 mya**), plants started moving onto land.
- 99% of living things were destroyed, **250 mya**.
- 5 million years later (**245 mya**) the *Age of Dinosaurs* began.
- Our continents started moving slowly away from each other, **150 mya**.
- **65 mya** 70% of all living things were destroyed, including all dinosaurs.
- **35 mya** our first primate ancestors identifiable.
- **0,1 mya** our first human ancestors appeared.



EON	ERA	PERIOD	MILLIONS OF YEARS AGO	KEY EVENTS
Phanerozoic	Caenozoic	Quaternary	1.6	<p>Humans evolve</p> <p>← Extinction of Dinosaurs</p> <p>← Permian mass extinction</p> <p>← Invertebrates become common</p> <p>← Earliest life</p>
		Tertiary		
	Mesozoic	Cretaceous	138	
		Jurassic		
		Triassic		
	Paleozoic	Permian	240	
		Carboniferous	330	
		Devonian	410	
		Silurian		
		Ordovician	500	
Cambrian				
Proterozoic		Also known as Precambrian	3500	
Archean				
Hadean				

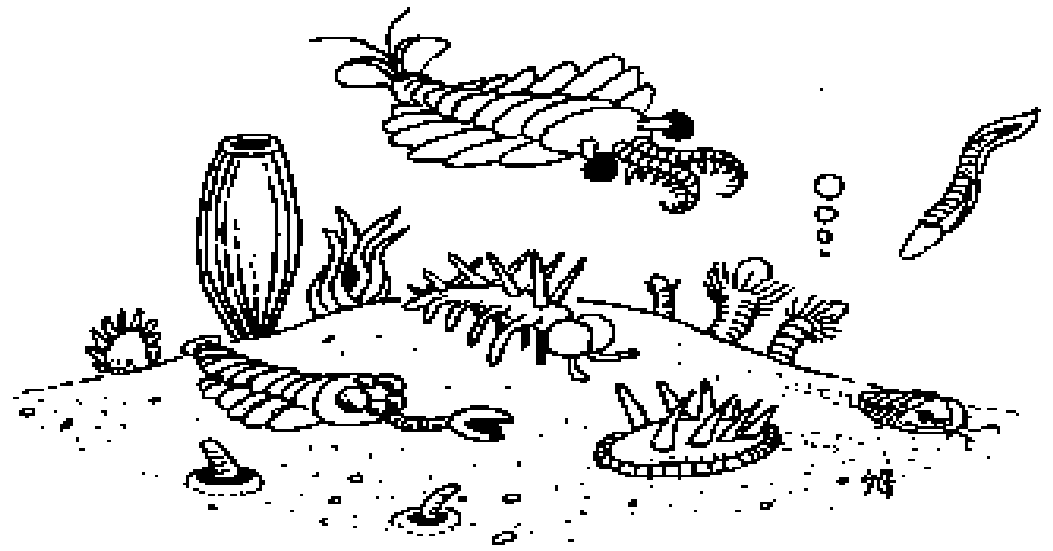
# GEOLOGICAL TIME-SCALE



- **Geologists**, who study the earth, have given us a **time-scale** that lists what has happened, and when it happened. (This is summarised on Page 82, but also look at that on Page 81.)
- There are only two *Eons*. The ***Archaen Eon*** was the first, and lasted more than 4 billion years. We are now in the ***Phanerozoic Eon***, which started 570 mya.
- There have been four *Eras* until now. The ***Pre-Cambrian Era*** finished together with the *Archaen Eon*. The next three *Eras* are called the **Ages of Ancient Life**, of **Reptiles**, and of **Mammals**, reflecting their life-types.
- Each *Era* is divided into different ***Periods***, starting with the *Cambrian Period*. As you move through these *Periods*, you will see that living things were constantly developing (*evolving*), from simpler forms to more complex forms.

# THE CAMBRIAN PERIOD

- This Period started a massive explosion of new life and living things. This might have been caused by:
  - A rise in levels of Oxygen.
  - A warmer environment.
  - Sea levels rising to allow protected, shallow waters.
- The ancestors of our crabs insects and spiders (the *Arthropoda*) developed in this Period.
- The ancestors of all vertebrates (*Chordata*) developed in this time as well.
- The *Cambrian Period* laid the foundation for the *Paleozoic Era*, at the end of which the ancestors of all our present plants and animals in the ocean were formed.



Cambrian Period

# THE "CAMBRIAN EXPLOSION"

Evidence in the fossil record shows that all major phyla were established in the **transition** from **Late Precambrian** to **Early Cambrian** time

Simple

Complex

Prokaryotes

Eukaryotes

Placozoa

Sponges

Cnidaria

Comb Jellies

Worms

Mollusks

Arthropods

Echinoderms

Hemichordata

Chordates



## EARLY CAMBRIAN

(Lowest Sedimentary Rock Layer formed because of the Flood)

One-celled  
Organisms

Multi-celled Organisms (Metazoans)

## LATE PRE-CAMBRIAN

(Hard Bedrock from Original Creation)

# CONTINENTAL DRIFT (Page 88)

248 mya – just after a mass extinction, just before the Age of Dinosaurs – all the land above sea-level was in one continent, called **Pangea**.



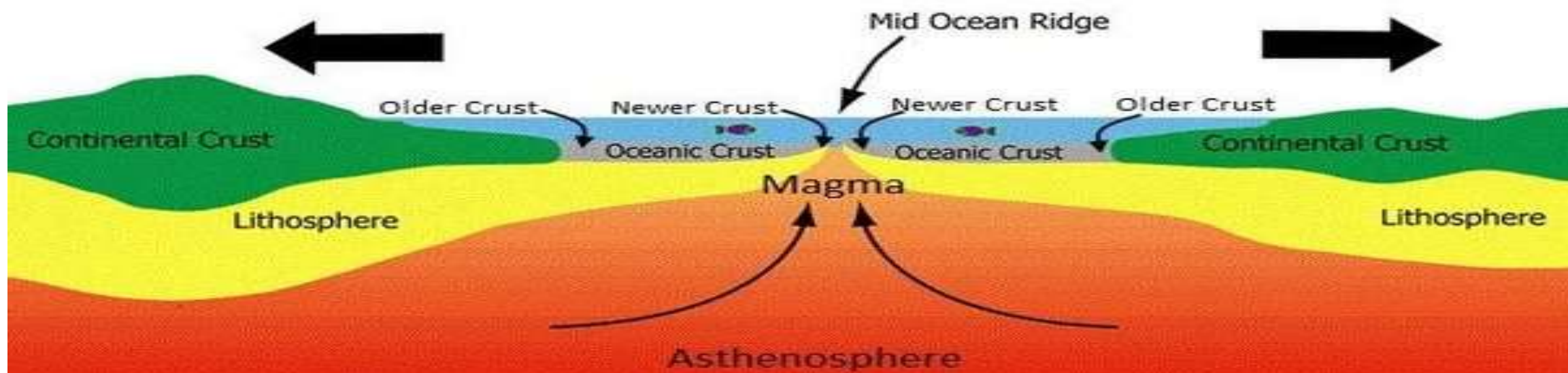
235 mya – half moved northwards (called **LaurAsia**) and the other half moved southwards (**Gondwana**).

- The **Tectonic Plates** on which the land was formed started moving apart from each other, resulting in the positioning of the continents today.

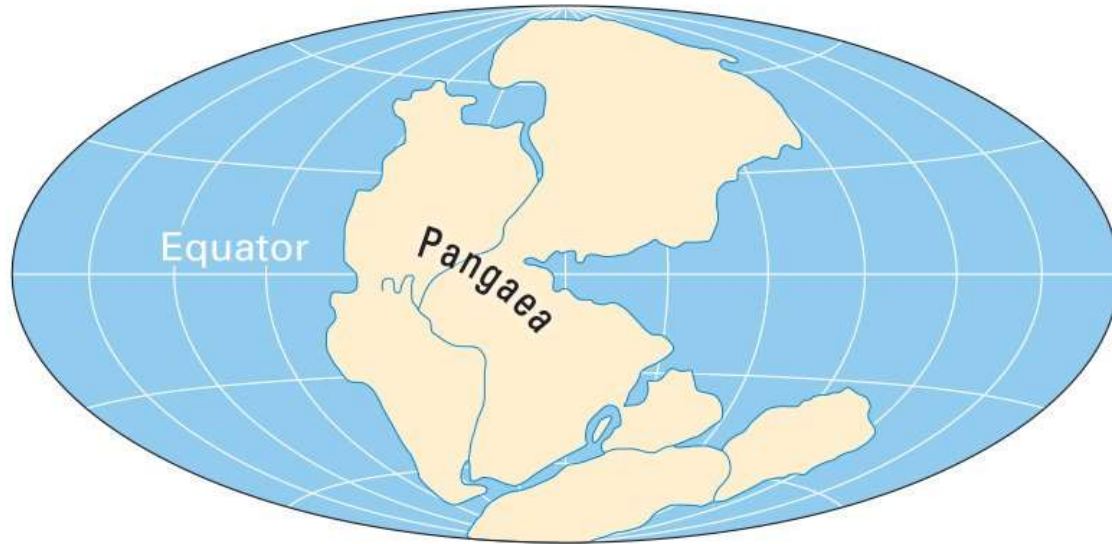




Sea Floor Spreading



# CONTINENTAL DRIFT OF PLATES



225 Million Years Ago



150 Million Years Ago



100 Million Years Ago



Earth Today