



Creation Walk

By Brian Grogan SJ and adapted for Season of Creation by Finbarr Keaveney

This Creation Walk is adapted from the booklet by Fr. Brian Grogan SJ, *Creation Walk: The Amazing Story of a Small Blue Planet* which is available from Messenger publications at <https://www.messenger.ie/product/creation-walk-the-amazing-story-of-a-small-blue-planet/>

We are very grateful to Finbarr Keaveney for adapting this resource for use during the Season of Creation or at other times throughout the year.

You might use this resource in your parish community by setting up stations around the church to convey the different stages of the story of our Universe. Or perhaps it is something that could be shared around your parish, using different houses or businesses as the various 'stops' on the journey for reflection.

Whatever way you decide to use this resource, we hope it will provide people with an opportunity to experience the wonder and awe of God's creation and to become familiar with the story of our Universe.

THE CREATION WALK INTRODUCTION

The Creation Walk is the story of the Universe, a story full of mystery, wonder and awe. It includes the story of our Common Home, Mother Earth, and the story of you and me. Because it is a divine story, appropriate scriptural quotations accompany the scientific account.



The story of the Cosmos has remained unknown until our own time, although it was talked about ever since humans sat around campfires 100,000 years ago and tried to understand where they had come from. Less than 100 years ago, in the 1930's, astronomers discovered that the Universe is expanding: this enabled them in the 1970's to work back to the moment when the Universe began, roughly 13.8 billion years ago. Only 50 years ago, in 1969, photos from the Apollo 8 spacecraft showed humans the whole Earth for the first time.

We then are the first generations to know the history of our home and our own remotest origins. The articles that follow will help you to walk through time, from its beginning until today: with the interplay of science and divine revelation, you will learn the extraordinary story of how we came to be where we are today. Knowing how the Universe has unfolded will bring us closer to the Creator, because God is author both of the book of Scripture and the book of Nature.

We are told that God walked in the Garden of Eden in the cool of the evening (Genesis 3:8). God still walks in the garden we call Earth, our Common Home, and will be with us till the close of this world's history and beyond. Each successive step described in this series is a divine total surprise and unpredictable, because 'my thoughts are not your thoughts, nor are your ways my ways, says the Lord' (Isaiah 55:8).

When we fear that all will end in catastrophe, the story gives hope of one more unpredictable divine twist whereby ultimately all will be made well.



'The universe is a single, gorgeous celebratory event!' – William Berry.

Note that all 'facts and figures' in the series are open to amendment in the light of ongoing scientific exploration. A primary sourcebook is Brian Swimme & Thomas Berry: *The Universe Story*; from the Primordial Flaring Forth to the Ecozoic Era, 1992. The Internet provides immense data—sometimes conflicting—on every topic touched on.

The Great Emergence 13.8 billion years ago.



Some 13.8 billion years ago, our Universe flared into existence: we call that moment the Big Bang. Time, space, and energy begin to exist. All that would ever come to be was already there, within the miracle of hydrogen and helium. The Universe expanded and cooled rapidly. Energy condensed into matter.

We belong to one another: We now know that the sacred community of the universe is a single interconnected web of life emanating from the creative energy of God. Before the beginning, 13.8 billion years ago, there was silence. No time, no space... nothing... only God, who is Spirit. *‘The earth was a formless void and darkness covered the face of the deep, while the spirit of God hovered over the face of the waters’* (Genesis 1:2). Suddenly everything burst forth from a single point—energy erupting with the brilliance of a trillion stars and the combined speed of a million hurricanes. This fireball flared forth in every direction, creating time and space. All the matter that exists now was present then in embryonic form. This means that every particle in the universe is at source connected to all others.

In the beginning God created the heavens and the earth (Genesis 1:1)

The Lord is a great God, and a great King above all gods.

In whose hands are the depths of the earth and the heights of the mountains.

The sea is God’s, who made it, and the dry land, which divine hands have formed (Psalm 95:4)

‘Wow! What happened next?’



2. One billion years later, galaxies emerged.

Galaxies came forth as billions of stars made of hydrogen and helium. Larger stars in their death throes exploded and become supernovas. As they blasted out into the cosmos, they created in their wombs the heavier elements from which life will emerge.

What are galaxies? We used to think that our Earth had a privileged place at the centre of the Universe, but recent astronomy shows that our solar system is only one among a vast number of others: our planet has been reduced in status to an infinitesimal speck in the galaxy to which we belong, because that galaxy is a vast cloud of one hundred billion stars. And there are more shocks: in the 1930s astronomers found that the nebulae—those small whitish clouds which we can see between the stars—are in fact clouds of galaxies, each one containing a hundred billion suns similar to ours. The majority of these suns are orbited by planets. ‘There are therefore in the universe thousands of billions of billions of billions of planets such as Earth’ (Carlo Rovelli: *Seven Brief Lessons on Physics*, 2014). We can’t comprehend such figures, but we can allow ourselves to be amazed at the size of the universe in which our brave little planet finds itself... and be amazed at God who looks after our little home so carefully.

God said to Job: ‘Where were you when I laid the foundation of the earth, when the morning stars sang together and all the heavenly beings shouted for joy?’ (Job 38:4-7)

‘Wow! What happened next?’



3. Two billion years later interstellar dust produced molecules.

Within the interstellar dust the chemical gifts of the supernovas were nurtured into simple organic molecules, vital components for the later emergence of life.

Molecules: What are these molecules, made from stellar dust? The world around us appears infinitely varied: just look at the substances around you, with their shapes and colours. As I type these words, I see wood, metal, glass, paper, plastic, flashing light-bulbs and more. Things seem solid, like my keyboard, or soft like my chair. We naturally think: that's the way things are: bump against a wall and you see how solid it is. Rock is dependable and durable, so we are safe building a house on it. But students of particle physics find a different world: behind all visible and tactile things are elementary particles which act as bricks in a gigantic Lego set: it is from these that all material reality is constructed. Think of a Russian doll! Each layer opens to reveal a smaller one, down to the tiniest. The components of the reality we see are atoms, but every atom is a nucleus surrounded by electrons; each nucleus contains protons and neutrons which in turn are made up of even smaller particles called 'quarks', and the force that 'glues' quarks inside protons and neutrons is happily called a 'gluon'.

Think now about all the particles you ate for breakfast! And then ask yourself, 'Am I composed of atoms too? Did I originate—literally—in stardust?' If you go back far enough, say 11.8 billion years— the correct answer to both questions is Yes!

'The heavens are telling the glory of God' (Psalm 19:1) 'God chose us in Christ before the foundation of the world' (Ephesians 1:4)

'Wow! What happened next?'



4. 4.6 billion years ago, birth of the Sun and our solar system.

It took nine billion years for our solar system and our Earth to emerge. An old star, our 'grandmother' star, exploded and the matter released gave birth to our Sun, to the planets and to the other members of our solar system. Here begins the story of what became the blue and white planet, our Earth. Earth is some 4.6 billion years old, and astronomers predict it will last for another 4.67 billion years. So it is now middle-aged—and currently in a mid-life crisis which we humans have caused!

To illustrate, let's drop the billions and imagine that Earth is 46 years old. Humans have been here 4 years; the Industrial Revolution began just one minute ago, and in that time we have destroyed 50% of Earth's forests. This is not sustainable. We love trees, but why should trees love us? Hence the emerging worldwide concern which we call 'ecological conversion'.

The Future of Earth: Earth is beautiful, fragile and finite. Born out of massive explosions and collisions as described above, it will be subject to further change. Within the immense ocean of galaxies and stars we are in a remote corner, and all are on the move. But whatever Earth's time-span we are designated by God 'to till it and care for it' (Genesis 2:15). Nature is friendly to us, and looks after our innumerable needs. In return we must care for Nature just as nature cares for us. Creation reveals the goodness, care and beauty of God, who has plans for the Universe and for ourselves of which we know so little. But we can trust God to 'make all things new' (Revelation 21:5) in ways that we cannot now imagine.

'I look at your heavens, the work of your hands, the moon and the stars that you have established' (Psalm 8:3)

'Wow! What happened next?'



5. 4.3 billion years ago, the Moon was born.

A recent theory proposes that Earth, while still a fluid molten ball, was impacted by a Mars-sized planet that caused some of the outer layers of the molten Earth to splash out and solidify into the Moon. That would answer the question of why so much of the Moon's makeup is similar to that of Earth.

The Moon's distance from Earth is 239,000 miles. It is 2,160 miles in diameter, one quarter of the diameter of Earth. It orbits Earth every 29.5 days. Travel time to the Moon by Apollo 11, is three days; by car 135 days at 70 miles per hour (113 km/h).

Thanksgiving: On July 21, 1969, Niall Armstrong became the first person to set foot on the Moon. Edwin Buzz Aldwin, a devout Presbyterian, took communion on the Moon's surface. He quoted texts from John 15:5: '*I am the vine, you are the branches*' and Psalm 8: '*God, what are humans that You are mindful of them?*' He invited those watching from Earth to give thanks, each in their own way. Every day we can give gratitude for our existence and life. Each Eucharist blesses God, 'Lord of all creation'.

The Earth's relationship with the Sun and Moon will choreograph its exquisite dance of life.

'God made the two great lights, the sun and the moon, and the stars' (Genesis 1:16) 'There is one glory of the sun, another of the moon, and another of the stars; indeed, star differs from star in glory' – (1Corinthians 15:41)

'Wow! What happened next?'



6. 4.1 billion years ago, the miracle of rain.

Earth slowly cooled and formed an atmosphere. As steam condensed above the Earth, the miracle of rain and weather cycles began. Torrential rains fell until rivers ran over the land and merged into oceans.

Water: The origins of water on planet Earth has long been a scientific puzzle not yet fully resolved. A 2018 study concluded that most of our water came from wandering waterlogged asteroids, and that other water molecules, hydrogen and oxygen, came from the solar cloud of **gas left over from the formation of the Sun. These soggy asteroids had begun developing into planets** while the solar nebula still swirled around the Sun, so they had some water on board. When these baby asteroids collided the bigger ones grew rapidly and eventually a chance collision introduced enough energy to melt the surface of the largest embryo into an ocean of magma. This largest embryo would eventually become Earth.

This recent study, if verified, has profound implications for both the origins of life on Earth and the possibility of life elsewhere in the Universe.

All life depends on water. Indeed the wars of the future may be Water Wars, because the volume of water on Earth is limited. Our National Holy Wells Day in mid-June is an effort to raise consciousness about water both locally and globally. Pope Francis in *Laudato Si* defends the right of all people to have free access to water.

‘The rain and the snow come down from heaven and do not return there until they have watered the earth’ (Isaiah 55: 10)

‘Wow! What happened next?’



7. 4 billion years ago, the first cells were born and life began.

Within the newly formed oceans a rich variety of chemicals gathered together in the form of bacteria. Earth awoke into life.

Life: Where did life come from? Whence the genetic code? The Royal Society's Evolution Prize for 2019, worth 10 million dollars, will be given to the first person who can bridge the gap between physics and biology. The winner must use only materials and conditions such as would have been to hand 4 billion years ago. Scientists give their lives trying to build even a single living cell. There are some 100 billion cells in your brain, and 37 trillion in your body!

What about bacteria? All living things are made of "cells", tiny bags of living matter that come in different shapes and sizes. Living things are made of pretty similar kinds of cells, but by far the most numerous forms of life are microorganisms, each of which is made up of just one cell. Bacteria are the most famous group, and they are found everywhere on Earth. The shape of the scientists' 'tree of life' suggests that a bacterium was the common ancestor of all life. In other words, all living thing – including you – are ultimately descended from humble bacteria. Their fossil remains date back 3.7 billion years.

God said, 'Let the waters bring forth swarms of living creatures' (Genesis 1:20)

'I will praise you because I am fearfully and wonderfully made' (Psalm 139:14)

'Wow! What happened next?'



8. 3.7 billion years ago, cells invent photosynthesis.

Bacteria invented ways to capture energy from the sun, thus creating new sources of food from water and simple minerals. In the process, however, they give off oxygen, a deadly gas that threatens life. But the dynamics of our little planet are self-correcting.

A delicate balance:

‘Had the supernova not exploded five billion years ago,

had the earth not maintained a certain temperature so that water would flow and life emerge,

had the ozone not processed out certain levels of radiation,

had the original fireball lasted just a few seconds longer or shorter than it did over 750,000 years of time,

or maintained a temperature just one degree hotter or colder over that long period of time, we humans would not exist.

We were indeed loved by the cosmos from the beginning’ (Matthew Fox).

God asked Job, ‘Have you entered into the springs of the sea or walked in the recesses of the deep?’ (Job 38:16)

‘Wow! What happened next?’



9. Two billion years ago Bacteria and Nuclear Cells.

The simplest forms of life began 3.5 billion years ago. Bacteria invented breathing, a new source of energy for Earth. They gradually entered into communion with larger cells. This relationship begot the nuclear cell, the basis for the evolution of all complex life.

What is life? While we know it when we see it, scientists cannot yet define it. And what is human life about? Is it for family, achievement, renown, wealth, longevity, bodily pleasures? Is there something overarching all these, or must we live, as Thoreau suggests, 'lives of quiet desperation'? Samuel Beckett asks the penetrating question, 'What are we meant to mean?'

The approach of the Bible is also surprising. It has rightly been called 'the Book of Suffering' but this eclipses its unequivocal message that happiness is indeed our destiny. Scripture speaks endlessly of blessedness, gift, glory, gratitude, happiness, joy, life, love promises, rewards and salvation!

Why this emphasis? Because we are made by God and for God; but God is happy—so happiness is at the core of our DNA! We are created to be happy, and as we grow in love of God we grow in happiness. 'To be near God is my happiness' (Psalm 73:28). The Holy Spirit guarantees God's love given to us (Romans 5:5), and the Spirit is life, joy and radiant happiness. It was for the joy set before him that Jesus endured the cross (Hebrews 12:2) and he says, 'May my joy remain in you and your joy be full' (John 15:11).

We are to be happy even now because as pope Francis puts it, 'When everything is said and done, we are infinitely loved'.

'Well done! Enter into the joy of your lord' (Matthew 25:21, 23) 'I want you to be happy, always happy in the Lord' (Philippians 4:4).

'Wow! What happened next?'



10. 1 billion years ago Multi-celled Life

Life is mysteriously drawn toward union: the first single-celled organisms learnt to share their genetic heritage by becoming multi-celled sexual creatures. They bequeathed to their progeny an extravagance of possibilities. Creativity expanded rapidly throughout Earth's waters, while worms and jellyfish appeared.

The Human Body: From conception through to embryo to fully-formed fetus to mature adult, our bodies are extraordinary achievements of nature. The body has 78 organs—including the brain, heart, hands, stomach and reproductive organs. We are made up of 11 essential chemicals—including oxygen, carbon, hydrogen, calcium, phosphorus. We are 60% water, and have 200 bones, framed to hold us together and protect our organs. The body is somewhat like a well-run city, with the brain as the City Manager operating a highly efficient information network through our nervous system. The brain has 86 billion nerve cells (neurons) – our 'grey matter'. These connect to billions of nerve fibres by trillions of connections (synapses). The body itself has 30 trillion cells, each with its own structure and function.

Our energy comes through our respiratory and digestive systems. Lungs take in air, extract life-giving oxygen, and expel carbon dioxide. The mouth takes in food and drink and with the help of a 30-foot digestive tract, converts it into energy. The cardio-vascular system circulates the blood and provides nutrients. The immune system is always on standby to come to the aid of areas that need help.

While eventually the whole body system breaks down and we become a handful of dust, we believe that God transforms our dust and raises us to new and everlasting life. How this will be we do not know. But the gospel writers have left us two resurrection images to play with: we are to be born again and we are to be raised up in glory, and in this glory all creation will share.

'God said, "Every moving thing that lives shall be food for you, and just as I gave you the green plants, I give you everything"' (Genesis 9:3)

'We are fearfully and wonderfully made' (Psalm 139:14)

'Wow! What happened next?'

11. 525 million years ago - Sight and Fish



In the oceans light-sensitive eyespots evolved into eyesight. Earth saw herself for the first time through the first fish forms, whose backbones encased the earliest nervous systems.

Eyesight: By studying the light-sensitive structures in existing species, scientists constructed hypotheses about how complex eyes like ours evolved. Eyes may have first evolved from the simple light-sensitive spots on the skins of some creatures, whereby outside information was taken in. Successive changes created a depression in the light-sensitive patch, a deepening pit that made 'vision' a little sharper. At the same time, the pit's opening gradually narrowed, so light entered through a small aperture, like a pinhole camera. Eventually, the light-sensitive spot evolved into a retina, the layer of cells and pigment at the back of the human eye, and over time a lens formed at the front.

It took millions of years for the human eye as we know it to emerge in Homo sapiens. But some other creatures developed sharper sight than ourselves. Some owls can pinpoint a mouse at a distance of a kilometre even when only candle-light is available. Pythons and boas have our eyesight but also can see in infrared: in the dark they can pinpoint prey from their body heat. Bees see ultraviolet light and can navigate from the position of the sun even when it is cloudy. Other insects see a riot of colour beyond anything we can imagine. Dragonflies have the best vision in the animal kingdom. Whereas humans can see colours as a combination of red, blue and green, dragonflies have up to 33 different types of light sensitive proteins. This keen eyesight enables them to be the most successful predator on the planet. Their bulbous eyes are made up of up to 30,000 facets, each pointing in a slightly different direction, enabling them to see in many directions at the same time.

'God created every living creature of every kind, with which the waters swarm' (Genesis 1:21)

Jesus said: 'The Lord has sent me to proclaim recovery of sight to the blind' (Luke 4:18)

'Wow! What happened next?'



12. 460 million years ago Plants and Animals

Leaving the security of swamps, worms, molluscs, and crustaceans took to our shores, learnt to breathe air, to survive weather extremes, and to resist gravity. Algae and fungi ventured ashore as well, and the first plants evolved as mosses.

Rock and Land: We take for granted the ground beneath our feet. But what is it made of? Land is a thin layer of clay or soil with rocks underneath. Below that is bedrock, hard, thick and solid. Ireland has a great variety of bedrock, dating from 1.8 billion to 600 million years ago. The upper part of the island we now know as Ireland belonged originally to a lost continent which evolved into North America: the lower part belonged to another lost continent from which Europe emerged. A great ocean separated the two continents until they collided 420 million years ago, and the land that became Ireland was pushed up, close to the Equator. A sea extended across Ireland, enabling the formation of sedimentary rocks such as sandstone and mudstone. Over the following 50 million years the warm waters acted as home to shellfish. As these died vast limestone deposits were formed, and under huge water pressure were changed into rock. Fossils of shellfish are frequently found in limestone.

Rocks, they say, are God's old notebooks!

Whether on the shore or in cliffs or in the form of gravel, each stone carries a vast history. We can admire its silent mystery. Carlos Drummond's deceptively simple poem, abbreviated here, points to the mystery even of a random stone:

In the middle of the road there was a stone/there was a stone in the middle of the road.

Never should I forget this event/in the life of my fatigued retinas.

Never should I forget that in the middle of the road/there was a stone. Now chat with a stone:
what does it wish to say?

'The Lord is my rock' (Psalm 18:2)

'I tell you that God is able from these stones to raise up children to Abraham' (Matthew 3:9)

'Wow! What happened next?

13. From 444 million years ago Five Mass Extinctions of Species

Fossil experts spot mass extinctions when species go missing from the global fossil record. Most extinctions were connected to rapid climate change.

444 million years ago, 86% of species lost

A short, severe ice age lowered sea levels, possibly triggered by the uplift of the Appalachians. The newly exposed silicate rock sucked CO₂ out of the atmosphere, chilling the planet.

375 million years ago, 75% of species lost

An example is the Trilobites, the most diverse and abundant of the animals that had appeared 550 million years ago. They survived the first great extinction but were nearly wiped out in the second, possibly because newly evolved land plants stirred up the earth, releasing nutrients into the ocean which triggered algal blooms which in turn sucked oxygen out of the water, suffocating bottom dwellers like the Trilobites.

251 million years ago, 96% of species lost

This third and worst extinction set life back 300 million years. It was caused by a cataclysmic eruption near Siberia which blasted out CO₂: global temperatures surged and oceans acidified, emitting poisonous hydrogen sulphide.

200 million years ago, 80% of species lost

No clear cause has been found for this extinction.

66 million years ago, 76% of all species lost

The Ammonite is an example. Its shell provided it with the fortification required to withstand the pressure of deep dives in pursuit of its prey. Dinosaurs may have ruled the land during this time but the oceans belonged to the ammonites. They perished together.

Between five and ten million years are needed for Nature to renew Earth with new species. 200,000 generations of humankind before we recover the biodiversity we have recently destroyed.

‘Animals, creeping things and birds of the air were blotted out from the earth. But God remembered Noah and the creatures whom he had shut into the ark’ (Genesis 7 and 8)

‘When you send forth your Spirit, you renew the face of the earth’ (Psalm 104:30)

‘Wow! What happened next?’





14. 400 million years ago - Flying Insects

Insects evolved with nearly weightless bodies that permitted them to take to the air as the first flying animals.

Take the Monarch Butterfly, the lord of the insect world. It develops from a tiny egg, becomes a caterpillar, forms a chrysalis, and finally transforms into a beautiful butterfly. The milkweed juices it assimilates makes it poisonous to birds, and its beautiful orange colour warns predators that they are toxic.

The female Monarch lays about 400 eggs on milkweed plants. These take two weeks to develop, after which the caterpillar's head becomes visible. It is only 2 mm long, but eats voraciously. First it eats its own eggshell, then feeds on milkweed. It eats day and night, only stopping to rest between meals. On its first day it consumes its own weight in food.

Next it leaves the milkweed plant and looks for a safe place to undergo its transformation, using a special gland in its mouth to weave a small silk button underneath a twig or leaf. It hangs upside down in the shape of a "J". In time it begins to move, forcing the skin to split open. It then looks like a giant green water droplet, and slowly changes shape and colour. The outer layer hardens into an elegant emerald case, decorated with golden dots. This case is known as a chrysalis, the Greek for "golden." Inside, three different hormones get to work to break down the pupa almost completely, only to recreate it in a new form. The change in lifestyle is immense, enabling it to have a different diet, habitat and movement than before.

When the wings are dry the Monarch takes to the air. Energy for flying comes from the flowers it visits. Each autumn, huge clouds of Monarch Butterflies gather in southern Canada and fly south some 3000 km for a winter vacation in Mexico.

‘God created every winged bird of every kind’ (Genesis 1:21).

‘Adam gave names to all cattle and to the birds of the air’ (Genesis 2:20)

‘Wow! What happened next?’



15. 335 million years ago Forests

It takes some 500 years to make a mature forest. Over generations, the early forests loaded themselves with carbon which they extracted from the atmosphere: this later became fossilized as coal and oil. Trees have been described as God's first temples. They are also a bit like monks who stay put, don't talk much but get on with inner growth. Trees work hard for us and for the environment, and also form a 'wood-wide web' of mutual communication and support. Mother trees recognize and talk with their kin, injured ones pass on their legacy to their neighbours; the healthy support the weak and give out warning signals to their friends when under threat. For instance, when a giraffe starts nibbling an acacia tree, the tree gives off an unpleasant gas: acacias close by pick up the message and pump unpalatable toxins into their leaves, so the hungry giraffe has to lunch elsewhere. A lesson here is that trees can smell! And when a caterpillar nibbles a leaf, electrical signals are emitted by the tree to ward off further damage. If the root is under attack, helpful fungi spread the word: their thin filaments are densely woven through the soil—one teaspoon of soil contains many miles of 'underground internet cable'. In this way, nutrients can be shared out to best advantage. A fungus in Oregon is perhaps 2400 years old, extends for 3000 acres and weighs 660 tons.

Trees grow at a leisurely pace which promotes long life. Redwoods can live over 2000 years. But imagine the amount of energy, know-how and organization a large tree needs. Food and water supplies must be secure; enemies such as wood beetles must be warded off, family must be attended to. A big tree is a community housing project: some 250 species may lodge in it—bats, woodpeckers, parasites. These do some damage to their host-trees but currently their worst enemy is the human species.

*God said, 'Let the earth put forth vegetation, plants and trees of every kind' (Genesis 1:11)
'The trees of the forest will sing for joy before the Lord' ([1 Chronicles 16:33](#))*

'Wow! What happened next?'



16. 235 million years ago - Dinosaurs

Dinosaurs first appeared 245 million years ago. They explored the extremes of size, speed and strength and ruled the Earth for 175 million years until wiped out 66 million years ago in the fifth Mass Extinction. Only the bird dinosaurs survived. The extinction was due to a triple disastrous event, involving asteroid impact, choking chemicals from volcanoes, and climate change due to the lengthy blocking out of the sun.

But only the big, classic dinosaurs are extinct. Birds are living dinosaurs. Imagine a chicken fluffed-up as a dinosaur! Fossils show that some dinosaurs had feathers or feather-like body covering, but many of them didn't fly and probably didn't even glide. Instead, feathers likely helped these bird-like dinosaurs stay warm as juveniles or send signals to other individuals.

The term *dinosaur* is derived from the Greek, meaning 'fearfully great reptile.' Some attained 20 meters (65 feet) in height, equal to a 7-storey building. (Giraffes are only 20 feet tall). Weight: up to 77 tonnes – the weight of 14 elephants. Length: 40 meters or 120 feet. Only whales have ever matched their bulk. There were several groupings in the species. Most worked together as hunters.

One branch, the Sauropods, were herbivores with long heads, necks and tails. They were among the largest land animals ever, but they likely had small brains. Some were gentle leaf-eating giants. Only two dinosaur bones been discovered in Ireland because most of our rocks pre-date the dinosaurs. Also Ireland was underwater for significant portions of time during the dinosaur era. But a lot was happening in that time below the surface of the world's oceans. Marine reptiles abounded, including tuna and dolphin-shaped ocean-going predators. These largely went extinct about 150 million years ago.

The Lord said: 'Do you give the horse its might? Is it by your wisdom that the hawk soars?' (Job 39:19, 26) 'Look at Behemoth—its bones are tubes of iron, its limbs like bars of iron—only its Maker can approach it' (Job 40:19)

'Wow! What happened next?'



17. 200 million years ago Mammals

Mammals (mamma = breast or teat) evolved from ancestral reptiles. Reptiles are cold-blooded and depend on the sun's heat for energy, whereas mammals are warm-blooded, generate their own heat, and can move around more freely. The first mammals were small and nocturnal insect-eaters who learned to jump, climb, swing, and swim through a world of giants. The emergence of mammals was a triumph of nature's capacity for adaptation.

There were other remarkable developments. While reptiles entrust their nests of well-stocked eggs to hatch and develop on their own, birds emerged which laid much smaller eggs, watched over them and cared for the chicks when hatched. Again, some mammals began to produce eggs within their bodies and provided them with a nurturing environment until they were ready to be born. They then invested enormous energy in caring for their offspring. Think of today's cows, cats and sows. They fed them with their own milk, which is rich in protein, carbohydrates and fats. This strategy called lactation (lac = milk), enabled mothers in the wild to spend more time in the burrow or nest, where they kept their young fed and warm, instead of having to go hunting. Gradually mammals took over the world and we humans derive from them.

Mammals are also characterized by the evolution of relatively large brains. It has been proposed that there is a threefold evolution of the human brain, from reptilian to mammalian to human—the neo-cortex. We need the three layers, but if mammalian and nurturing care is poor or almost absent, an individual is deprived of the capacity for bonding, relationship and love. When the reptilian instinct for survival links with the reasoning capacity, but without the intervening level of affectivity, a toxic combination results, and may explain appalling behaviour for which the individual may not be fully morally responsible.

‘Can a woman forget her nursing child, or show no compassion for the child of her womb?’
(Isaiah 49:15)

‘Wow! What happened next?’



18. 150 million years ago Birds and Flowers

Birds evolved from a sub-group of ancestral dinosaurs, and Earth broke into song. Earth also adorned herself in colourful and fragrant flowers irresistible to insects. Birds and flowers are among the creatures that draw our universal respect. Imagine a silent and colourless world such as was portrayed by Rachel Carson in her *Silent Spring*, 1962! But a quarter of the world's bird species have been wiped out in recent years, so bird conservation is a pressing concern.

The variety of flowering plants is enormous and glorious. *Laudato Si* notes that that all creatures have their own purpose; they are not simply for us, and their multiplicity and variety expresses something of the nature of God (83, 86).

In spring and summer flowers emerge and fruit trees burst into blossom. They gladden our hearts, but also use their beauty of colour and form to attract pollinators, else they would not produce the seeds needed to survive as a species. Different colours and shapes attract different pollinators—bees, butterflies etc. When pollination is complete, flowers drop their advertising strategies and fade, but while doing so they produce seeds. When these mature they need to be dispersed, either by wind or water, or by hitching a ride from some passing creature. Think of the lowly dandelion as its yellow face transforms into a downy head of seeds, each with a little parachute to sail off to a destination unknown. The fruit which may encase the seed—as in apples and haws—attracts birds and animals: they eat the fruit and deposit the inedible seeds at random. Delicate orchid seeds need a particular fungal association to give them lodging till they mature.

Each species has evolved its own distinctive methods of family planning, else it would have disappeared long ago. The most attractive flowers attract the most insects, so we must defend our insect pollinators in order that flowers may continue to radiate their beauty.

‘Jesus said: “Consider the ravens; they neither sow nor reap, they have neither storehouse nor barn, and yet God feeds them. And consider the lilies, how they grow: they neither spin nor weave, yet I tell you that even Solomon in all his glory was not clothed like one of these” (Luke 12:24-27)

‘Wow! What happened next?’



19. 60 million years ago The Carnival of the Animals

After the Fifth Mass Extinction, 66 million years ago, when the dominating dinosaurs had disappeared, Nature got to work again. Surviving small mammals began to evolve rapidly and diversify into a wide range of habitats. Earth greeted rodents, monkeys, horses, cats and dogs, elephants, chimpanzees, camels, bears and pigs.

Water Fresh water was vital for the survival and development of all these species. A horse needs 5-10 gallons a day; an elephant needs a full bathtub–50 gallons. So what is water? The chemical formula H_2O means that one molecule of water is composed of two hydrogen atoms and one oxygen atom. Simple! But the origins of Earth's water are not yet fully known. A 2018 study suggested that most of our water came from wandering waterlogged asteroids, and that other water molecules, hydrogen and oxygen, came from the solar cloud of **gas left over from the formation of the sun. These soggy asteroids had begun developing into planets** while the solar nebula still swirled around the sun, so they had water on board. When baby asteroids collided, the bigger ones grew rapidly and eventually a collision introduced enough energy to melt the surface of the largest embryo into an ocean of magma–hot molten rock. This largest embryo eventually became Earth and husbanded a great deal of water.

This recent study, if verified, has implications both for the origins of life on Earth and the possibility of life elsewhere in the universe.

All life depends on water. Indeed the wars of the future may be Water Wars, because the volume of water on Earth and beneath its surface is limited. Following the UN Declaration on Human Rights in 1948 Pope Francis in *Laudato Si* says that access to safe drinkable water is a basic and universal human right, since it is essential to human survival, and that we have a grave social debt towards the poor who lack access to drinking water.

‘The rain and the snow come down from heaven and do not return there until they have watered the earth’ (Isaiah 55: 10)

‘Wow! What happened next?’



20. 6 million years ago The Ancestors of Homo sapiens

The Creation Walk is a story of ongoing change, development and novelty. New fossil discoveries and the use of DNA continue to rewrite the complex history of our family tree. Six million years ago saw the last grandparents of humans and chimpanzees. Creatures with ape-like protruding faces, powerful jaws and small brains began to leave the forest, stand up and walk on two legs. The savanna offered challenges and opportunities for these hominins—our earliest ancestors—to evolve.

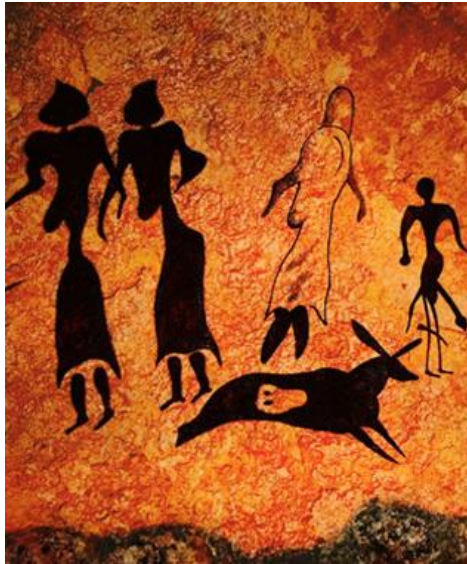
Over millions of years our forebears developed large brains, strong wrists and thumbs, flexible waists, long legs and short toes. Such features supported two defining trends in our evolution: upright movement and capacity to use tools. Different species emerged. Homo Sapiens evolved in Africa about 200,000 years ago, and had many cousins, but all have vanished. Did our species simply outstrip their cousins or eliminate them as rivals? We do not know.

But we do know some of the tortuous paths by which the development of our species occurred. The discovery of fire 300,000 years ago fostered the social trait of cooperation. Tools date back 200,000 years, a critical milestone in determining the emergence of Homo sapiens. Language brought an ever-increasing capacity to share knowledge, to imagine, to experiment and to follow through on results. Watching young children we see that innate curiosity distinguishes human offspring, whereas for other animals consciousness is a part-time employee. Monogamy may also have favoured development, likewise an ideal of justice and fairness, as found in the myriad expressions of the Golden Rule – ‘Do to others as you wish them to do to you’.

Homo sapiens began to spread from Africa to Australia and to America. This occurred multiple times, most recently about 60,000 years ago. The Neanderthals had been dominant in Europe but went extinct 30,000 years ago. By 13,000 years ago the Cro-Magnon race of Homo sapiens was the only surviving human species, and began to dominate the world.

‘God created humankind in the divine image: male and female God created them and said to them, be fruitful and multiply and fill the earth’ (Genesis 1:27- 28)

‘Wow! What happened next?’



21. 200,000 years ago Homo sapiens Expansions of Consciousness

Skeletons of our species date from at least 200,000 years ago. Homo sapiens roamed a region of South Africa 165,000 years ago, and we catch glimpses of how they lived first through the abundance of artifacts and then through the wonders of cave art they left behind. The earliest evidence of symbolic expression—creating a shape that stands for something else—dates back 100,000 years. Today we are awash with symbols—highway signs, iPhone icons, wedding rings, tattoos, national flags. But as far back as 36,000 years ago some of our ancestors stood by flickering firelight and began to draw on the bare walls of their caves profiles of cave lions and bears, herds of rhinos and mammoths, horses and ibex, an immense bison—442 animals in all, done in ochre over a huge period of time and using 400,000 square feet of cave surfaces as canvas. Stencilled handprints are found which send a message: ‘I am alive! I was here! I am human. I belong’.

Most of our knowledge of early human development comes from fossil records and tools, so the birth of spoken language remains one of the great mysteries. But with its evolution our species developed the exponentially growing world of knowledge and began to share information, beliefs, experiences and skills. Huge shifts in consciousness and relationships were required to bring this about.

Today through the new cosmology we have more than enough data to bring us to another expansion of consciousness: a sense of the world community of all living things. There emerges hope that we can move beyond wars, rivalries, boundaries and

possessiveness. The universe is not ours to control and possess: like the early dwellers on Earth we must emerge from the caves and forests of our tribal mentalities to share with others the vast world around us. The new cosmology provides common ground for us to live in harmony with one another and with all other species.

‘When I look at the heavens, the moon and the stars you have established, what are human beings that you are mindful of them, mortals that you care for them?’ (Psalm 8:3-4)

‘Wow! What happened next?’



22. 16,000 years ago Ireland's Ice Cap Melts

The last European Ice Age began 1.8 million years ago due to a fall in global temperatures. The resultant ice-cap was some 1000 meters deep and several hundred tonnes per square metre. Our most recent glacier began 30,000 years ago and shaped our landscape with graceful hills, corrie lakes and eskers, and with moraines and drumlins—mounds of gravel left behind by the glacier. The Irish Sea was originally a large freshwater lake: warmer weather brought about rising sea levels so that it became a salt water sea. The Ice Cap also spread that covering of soil which makes Ireland fertile and green: soil or clay is a combination of decayed organic matter from forests and rock materials ground down by the ice.

The First Irish The first humans arrived in Ireland 9,000 years ago when the ice-cap was long gone. Their lasting memorials are their burial sites, Newgrange dates back 5,200 years, 700 years before the Egyptian Pyramids, and might have taken 300 workers 20 years to construct. Since the dawn of human history humans have honoured their dead with mourning, proper burial, care of tombs, and have nourished hope, however dimly perceived, of an afterlife.

The Hebrews believed that the dead were gathered as shadows in Sheol, without life or hope.

While they yearned that God's faithfulness might restore the just to life forever, hope for immortality awaited proof. Seen in this context, Jesus' promise to his hearers that eternal life could be theirs was astounding. Even more astounding was his own resurrection from the dead, which was understood as being not for himself alone but for all. Billions of our ancestors have died, and so shall we, but in Christian belief death is now only the passageway to everlasting life. Perhaps the passage grave and burial chamber at Newgrange, which is illuminated by dawn sunlight for 17 minutes annually, already hinted at this hope.

'God said: "From whose womb did the ice come forth, and who has given birth to the frost of heaven?"' (Job 38:29) 'Job said: "I know that my Redeemer lives, and in my flesh I will see God for myself; my eyes will behold God, and not as a stranger. How my heart yearns within me!"' (Job 19:25-27)

'Wow! What happened next?'

23. 11,000 years ago Agriculture

Early humans were hunter-gatherers: they gathered wild fruits and hunted animals. Slowly the more manageable species were domesticated: goats, horses, camels; wheat, rice, peas, lentils, olives and grapes. Our cuisine today is basically that of our ancient farming predecessors.



Stewardship of the Earth Laudato Si reminds us that since everything has a value of its own in God's eyes, we are called to be stewards, custodians, trustees or guardians of Nature, but never its dominators. We are to reflect the divine care that cherishes all creation (67-69), and to till and keep—that is, cultivate and protect—the gift loaned to us by God (Genesis 2:15). Ecology is thus firmly located in the realm of the sacred, and God's preferential care for the poor and marginalized of this world is now seen to embrace the oppressed species which we carelessly destroy.

Reading the parable of the Good Samaritan today, therefore, we must include both our injured and despoiled neighbor and all of creation. The wounded and half-dead traveler in the story can stand for Mother Earth, and we are to be the Samaritans that bind her wounds, pouring in oil and wine, carrying her to safety and bearing the cost of her recovery (Luke 10:25-37).

As humans we need to learn the self-sacrificing rhythms of Nature, where receiving and giving is the central dynamic. Growth and decay, living and dying, are an interwoven cycle. The air molecules we breathe were breathed by others before us—by animals and humans, by women and men, by saints and sinners, by the small and great, by Jesus and Mohammed! Nature is the ultimate genius for recycling, and everything is in process of becoming something else.

This is the dance of creation. The philosopher Nietzsche (d. 1900) who coined the phrase 'the death of God' remarked, 'I would believe only in a god that knows how to dance'. The theologian Leonardo Boff confidently states that at the close of history we will sing and dance forever with God and the created world.

'The Lord God put human beings in the garden of Eden to till it and keep it. Abel was a keeper of sheep, and Cain a tiller of the ground' (Genesis 2:15; 4:2)

'Wow! What happened next?'



24. 5,000 years ago Empires and Religions

Agriculture led to collaboration and to cities. In the Near East empires emerged and disappeared: the Sumerian, Egyptian, Assyrian, Babylonian, Greek, Persian, Roman.

The Major Religions began to emerge—Hinduism (c. 2000 BC), Judaism (1250 BC), Confucianism (550 BC), Buddhism (500 BC), Christianity, (1st c AD). Islam came later (600 AD).

The Hebrew Story The Hebrew story originates with a Hebrew slave in Egypt about 1250 BC. Moses, a criminal turned shepherd, experienced himself being spoken to out of a burning bush. The mysterious speaker knew the name which had been given him by Pharaoh's daughter. When Moses asked, 'Who are you?' the reply was both profound and puzzling: 'I am who I am. I just am.' Fascinated, he was told to come no closer, but to take off his sandals, because the patch of desert he was standing on was 'holy ground'. Moses, a nonentity with a dark past, was then commissioned to liberate his people in the name and power of this Being, to whom the Hebrews gave the name Yahweh.

In epic stories the Hebrews attributed their liberation and subsequent history to 'the One who simply is'. Later they judged that Creation itself must also be the work of Yahweh, and so they devised the Genesis stories, written in the 6th c BC. Through political upheavals and religious oppressions, the tiny land of Israel survived and clung to its faith in Yahweh.

The primary focus of the Hebrew Bible, however, is less on creation than on God's activity in the world. Yahweh has a single great plan of salvation, embracing human and cosmic history from creation to consummation. As Creator, Liberator and Redeemer, the One who simply is will shepherd home not only the Hebrews but all peoples.

'From one ancestor God made all nations to inhabit the earth, so that they would search for and find God, though indeed God is not far from any of us' (Acts 17:26-27)

'Wow! What happened next?'



25. 2,000 years ago The New Creation

In the Christian view Jesus is not simply a religious leader among others, but the One who brings the process of evolution to an entirely new level.

‘The Christian view is that the Next Step (in evolution) has already appeared. And it is really new. It is not a change from brainy into brainier people: it is a change that goes off in a totally different direction—a change from being creatures to being sons and daughters of God. The first instance appeared in Palestine two thousand years ago’ – CS Lewis.

Jesus emerges from the shadows of pre-history as the One who is both human and divine. He is presented as ‘the light of the world’ and invites all humankind to share his divinity. He proclaims a kingdom based on mutual forgiveness, inclusion and love. With his resurrection from death begins the divinizing of humankind and of all creation (Laudato Si 236; Romans 8:21).

The New Testament - Compiled soon after the time of Jesus, the Christian Bible or New Testament is an effort to convey God’s extraordinary intentions for humankind. St Paul states it simply: ‘When anyone is in Christ, there is a new creation’ (2 Corinthians 5:17). This ‘new creation’ is spelled out as eternal divine companionship.

The New Testament is the best-selling book of all time and the most fought-over. it offers profound and hope-filled enlightenment on the ultimate meaning of human existence. God’s creative and redeeming activity as revealed in Jesus overarches all else: ‘I have come that people may have life, life to the full’ (John 10:10). ‘Life to the full’ means everlasting life. This central message of hope is carried in short phrases scattered like jewels across its pages. We discover that we were chosen out before the Creation Walk ever began, and invited to live through love in the divine presence. More than a set of beliefs, Christian faith is interpersonal and brings us into a network of divine relationships. The divine is already disguised in the human and in due time will burst forth in glory.

‘To all who received him Jesus gave power to become children of God. We will be like God because we will see him as he is’ (John 1:12; 1 John 3:2)

‘Wow! What happened next?’