



معهد الكويت للأبحاث العلمية  
Kuwait Institute for Scientific Research

---

# Curiosity about the origin and fate of the planet earth

**Dr. Abdul Rehman Khan**  
**Consultant**

**Environmental Pollution and Climate Change Program,  
Environment and Live Science Research Centre  
Kuwait Institute for Research**

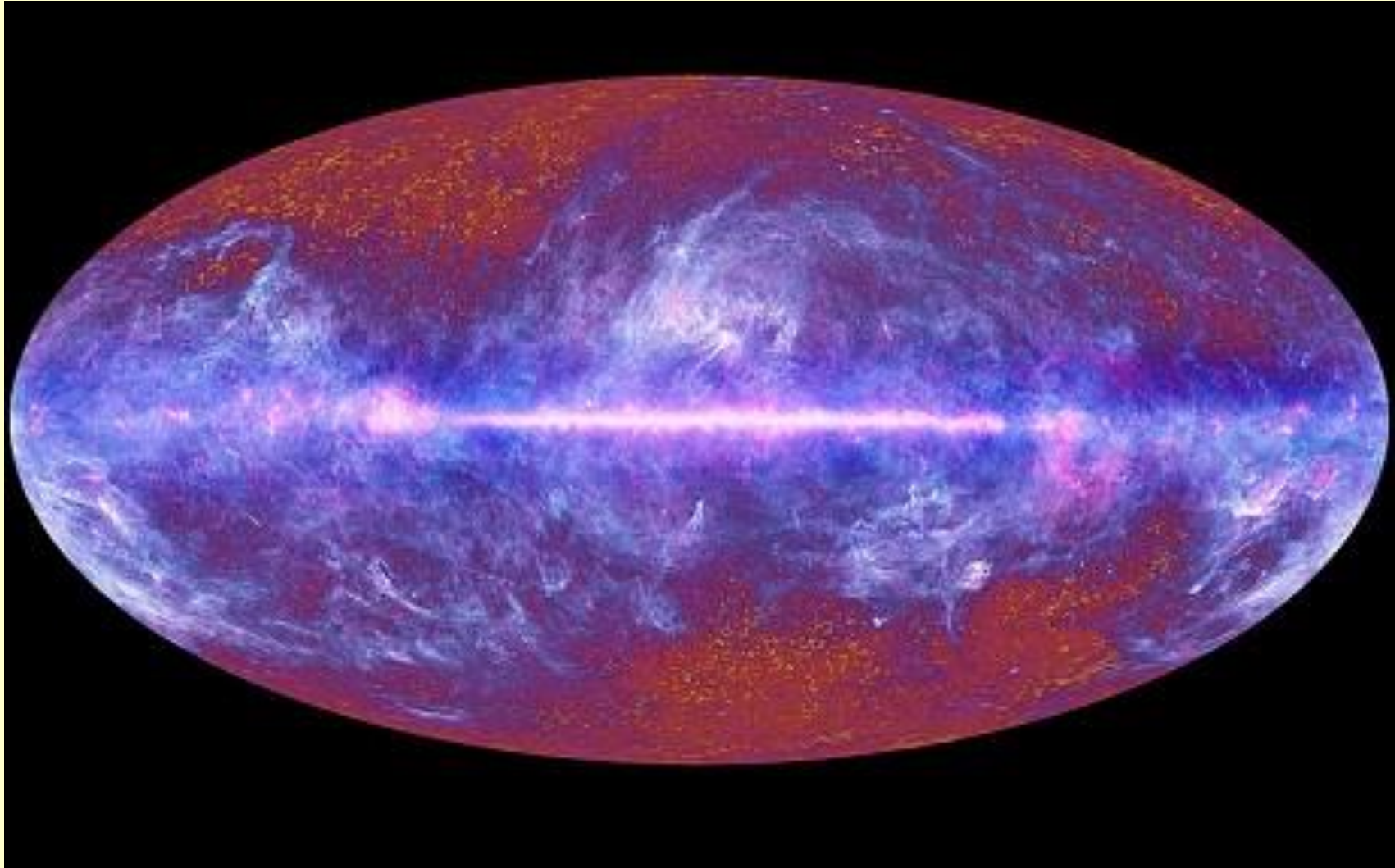
*21<sup>st</sup> November, 2015*

# Outline

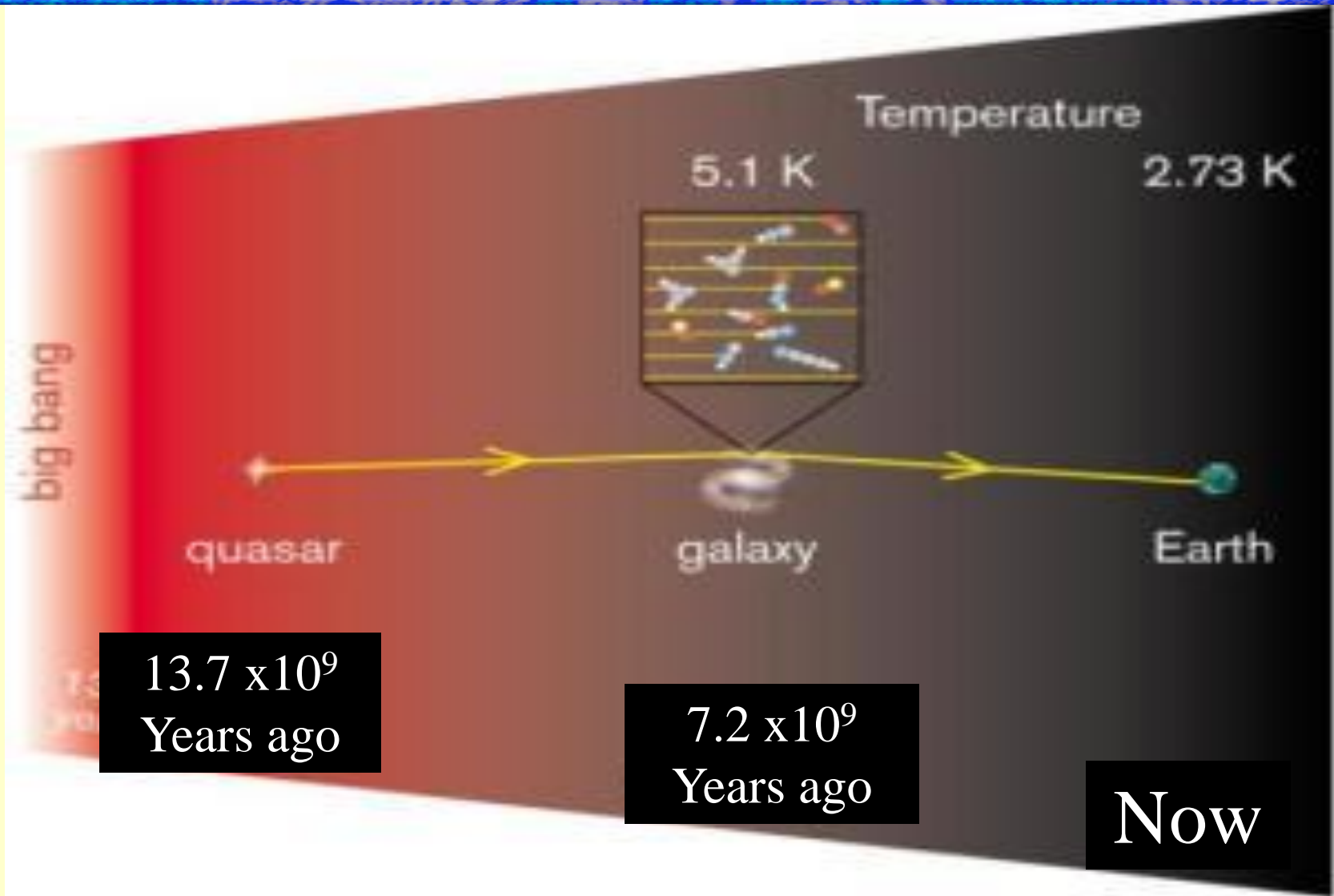
---

- **Big Bang Theory**
- **Religious view**
- **Origin of mother earth**
- **Start of life (Religious view, Theory of Evolution)**
- **Disaster all are due to celestial objects, either locally occurring on our planet or asteroid, comet or other objects from space on collision course could vanish the existing life and originate new form.**

# Big-Bang 14-15 Billion years ago



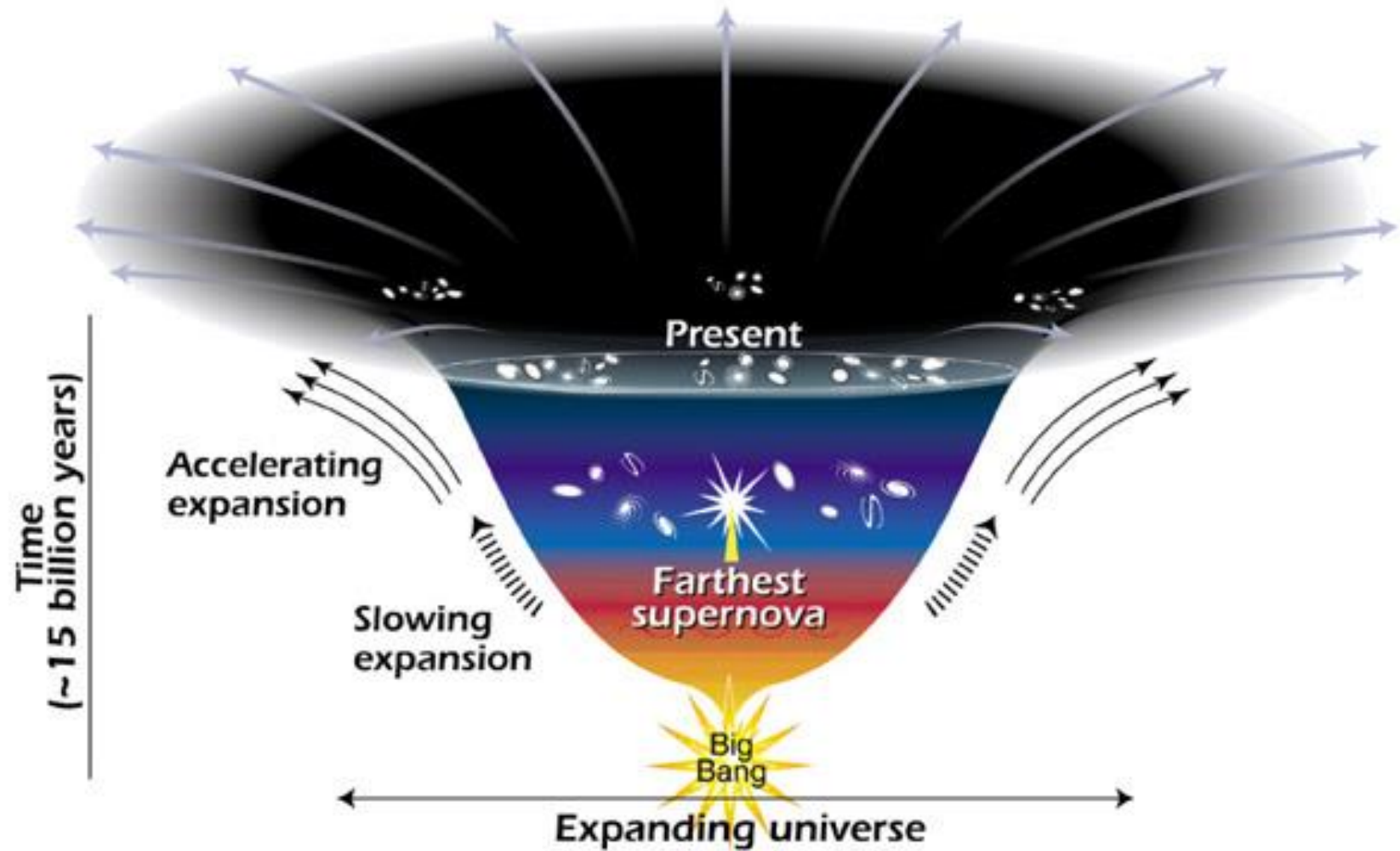
# Timeline



# Distant galaxy found by Hubble Telescope

**The most distant galaxy is just 700 million years after the Big Bang, when the universe was only about 5 percent of its current age of 13.8 billion years.**





This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe began flying apart at a faster rate. Astronomers theorize that the faster expansion rate is due to a mysterious, dark force that is pushing galaxies apart.

# THE BIG BANG THEORY

TIME BEGINS

ONE SECOND

PRESENT DAY

Time  $10^{-43}$  sec.  
Temperature

$10^{-32}$  sec.  
 $10^{27}$ °C

$10^{-6}$  sec.  
 $10^{13}$ °C

3 min.  
 $10^8$ °C

300,000 yrs.  
 $10,000$ °C

1 billion yrs.  
 $-200$ °C

15 billion yrs.  
 $-270$ °C

**1** The cosmos goes through a superfast "inflation," expanding from the size of an atom to that of a grapefruit in a tiny fraction of a second

**2** Post-inflation, the universe is a seething, hot soup of electrons, quarks and other particles

**3** A rapidly cooling cosmos permits quarks to clump into protons and neutrons

**4** Still too hot to form into atoms, charged electrons and protons prevent light from shining; the universe is a superhot fog

**5** Electrons combine with protons and neutrons to form atoms, mostly hydrogen and helium. Light can finally shine

**6** Gravity makes hydrogen and helium gas coalesce to form the giant clouds that will become galaxies; smaller clumps of gas collapse to form the first stars

**7** As galaxies cluster together under gravity, the first stars die and spew heavy elements into space; these will eventually form into new stars and planets

NOTE: The numbers in cosmology are so great and the numbers in subatomic physics are so small that it is often necessary to express them in exponential form. Ten multiplied by itself, or 100, is written as  $10^2$ . One thousand is written as  $10^3$ . Similarly, one-tenth is  $10^{-1}$ , and one-hundredth is  $10^{-2}$ .

Source: *The Birth of the Universe*; *The Kingfisher Young People's Book of Space*

TIME Graphic by Ed Gabel

# Journey in Time

---

- 1. The cosmos goes through a superfast “inflation” expanding from the size of an atom to that of a grape fruit in a tiny fraction of a second. ( $10^{-43}$  seconds, Temp = very high)**
- 2. Post inflation, the universe is hot seething soup of electrons, quarks and other particles ( $10^{-32}$  seconds, Temp =  $10^{27}$  °C)**
- 3. A rapid cooling cosmos permits quarks to clump into proton and neutrons. ( $10^{-6}$  seconds, Temp =  $10^{13}$  °C)**
- 4. Still too hot to form into atoms charged electrons and protons prevent light from shining: the universe is superhot fog. (180 seconds, Temp =  $10^8$  °C)**



# Continued

---

- 5. Electrons combine with protons and neutrons to form atoms mostly hydrogen and helium. Light can finally shine.  
(300,000 years, 10,000°C)**
- 6. Gravity makes hydrogen and helium gas to coalesce to form the giant cloud that will become galaxies: smaller clumps of gas collapse to form the first star.  
(10<sup>9</sup> years. -200 °C)**
- 7. As galaxies cluster together under gravity, the first stars die and spew heavy elements into space : these will eventually form new stars and planets.  
(15x10<sup>9</sup> years, -270°C)**

# Religious view

- 1. Genesis 1:1 NIV, narrates “God created heavens and earth”**
- 2. Genesis 1:2 NIV describes "Now the earth was formless and empty, darkness was over the surface of the deep, The Spirit of God was hovering all-over lands and waters" .**
- 3. Science and religion has tremendous amount of disagreement.**
- 4. Scientific theory or religious doctrine can only be half-right in their understanding of the creation of the universe or the origin of humanity. Together however, the picture is complete and harmonious.**
- 5. The universe as it exists was not produced by some cosmic accident. A mindless *uncontrolled* "big bang" would result in destruction and chaos, not the life and order as it exists.**
- 6. Big bang: followed by orderly development (from natural laws put into force beforehand by a Creator) of stars, galaxies and everything else, is reasonable and logical. It satisfies both religion and science.**

# First Seven Days

---

- 1. First day**, Genesis 1:3 NIV, "Let there be light" The sun shines brightly and the light was made separate from darkness. A period of opaque light, and a period of darkness. (Genesis 1:3-5)
  - 2. Second day**, . God then caused most of the water to condense onto the cooling earth that simultaneously formed a whole-planet ocean and cleared the sky. (Genesis 1:6-8).
  - 3. Third day**, The earth changed from molten "cue ball" to a planet with an irregular surface with ocean basins and continental landmasses. With dry ground available, the first plants were made to grow in great abundance. (Genesis 1:9-13)
  - 4. Fourth day**, The sun marked the day (sunset to sunset), the moon the month , and the stars the seasons. (Genesis 1:14-19)
-

# Continued

---

- 5. Fifth day, Great numbers of birds and sea creatures. God created and said, "Be fruitful and increase in number and fill the water in the seas, and the birds on the earth." (Genesis 1:20-23)**
- 6. Sixth day, Vast numbers of land animals including human were created.(Genesis 1:24-31)**
- 7. Sabbath day, "By the seventh day God had finished the work, He rested from all His work". The day that is the basis for The Fourth Commandment. (Genesis 2:2-3).**

**These days and their durations are literal or symbolic but it is clear from carbon dating of fossils that start of life was  $10^9$  years later than the creation of earth.**

# Earth formation



# Sun Facts

Surface temperature: 5,778 K

Mass:  $1.989 \times 10^{27}$  Ton

Radius: 695,500 km (432,450 miles)

92% H<sub>2</sub> and 7% He

Complete rotation every 27 days

$93 \times 10^6$  miles ( $1.8 \times 10^8$  km) away from us

Density =  $1408 \text{ kg m}^{-3}$



# Moon Formation

**4.5 billion years ago a gigantic collision between a Mars-size object named Theia**

**and Earth, had largely melted the Earth. 500 Million years between the earth and moon**

Copyright (C), 2006, by Fahad Sulheira. FREE image use: <http://www.novacelestia.com/faq.html>



21 Nov., 2015

# Mother Earth Satellite image from Space

**You are  
here** 



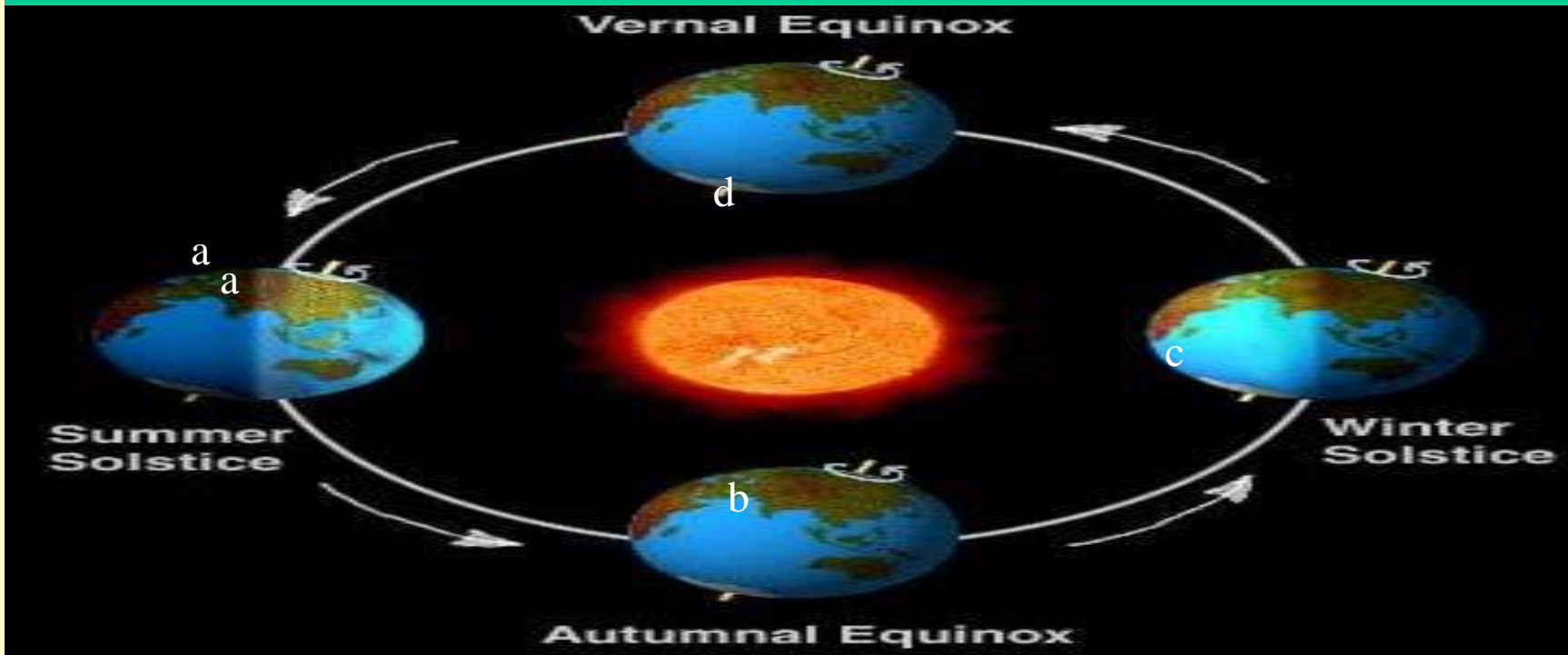


# Fact Sheet for other planets

<u>MERCURY</u>	<u>VENUS</u>	<u>EARTH</u>	<u>MOON</u>	<u>MARS</u>
330x10 <sup>18</sup> ton	4.87x10 <sup>21</sup>	5.97x10 <sup>21</sup>	73x10 <sup>18</sup>	642 x10 <sup>18</sup>
4879 km	12104	12756	3475	6792 (dia)
57.9x10 <sup>6</sup> km	108.2	149.6	Away sun	227.9
5427	5243	5515	3340	3933 (ρ)
88 days	224.7	365.2	27.3	687 (days)
<u>JUPITER</u>	<u>SATURN</u>	<u>URANUS</u>	<u>NAPTUNE</u>	<u>PLUTO</u>
1899x10 <sup>24</sup> kg	568	86.8	102	0.0125(mass)
142,984 km	120,536	51,118	49,528	2,390 (dia)
778.6x10 <sup>6</sup> km	1433.5	2872.5	4495.1	5870
1326	687	1270	1638	1750 (ρ)
4331	10747	30589	59800	90588(days)

# Seasons and their influence

- ❖ Earth radius 3965 miles, 3950 miles
- ❖ Rotation 15°/hr, 1040miles/hr, 1500ft/s, 1670km/hr, 464m/s
- ❖ **Earth rotation around the sun generates four seasons**
  - ❖ **Orbit Radius ( $153 \times 10^6$  km,  $147 \times 10^6$  km)**
  - ❖ Average orbit radius  $150 \times 10^6$  km  $\approx$   $93 \times 10^6$  miles
  - ❖ Earth speed 29.8km/s or 18.5miles/s 105,000km/hr



**Milky-way Galaxy**  
**Speed of Rotation**  
**350-400km/s**

**or**

**$1.44 \times 10^6$  km/hr**

**or**

**$34.6 \times 10^6$  km/d**

**or**

**$12.6 \times 10^9$  km/yr**

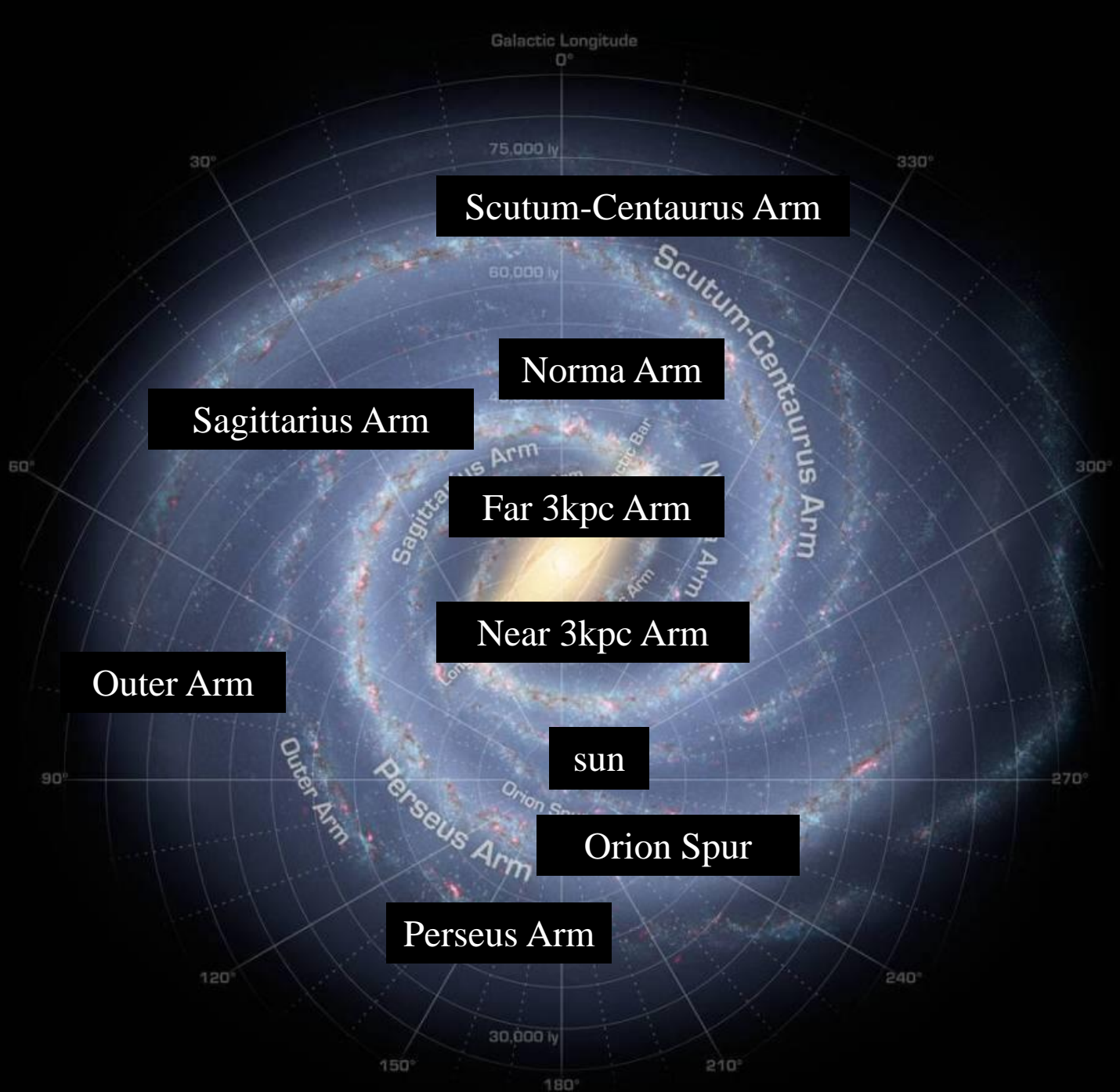
**Light year**

**$9.5 \times 10^{12}$  km**

**$10^5$  light year**

**Equivalent to**

**3 kpc**



21 Nov, 2015

# Bulk parameters

Mass ( $10^{21}$ Ton)	5.9736
Volume ( $10^{10}$ km <sup>3</sup> )	108.321
Equatorial radius (km)	6378.1
Polar radius (km)	6356.8
Volumetric mean radius (km)	6371.0
Core radius (km)	3485
Mean density (kg/m <sup>3</sup> )	5515
Surface gravity (m/s <sup>2</sup> )	9.798
Surface acceleration (m/s <sup>2</sup> )	9.780
GM ( $\times 10^6$ km <sup>3</sup> /s <sup>2</sup> )	0.3986
Number of natural satellites	1

## Chemical Composition of the Earth:

**Fe = 34.6%,**

**O = 29.5% ,**

**Si = 15.2% ,**

**Mg =12.7%,**

**Ni = 2.4%,**

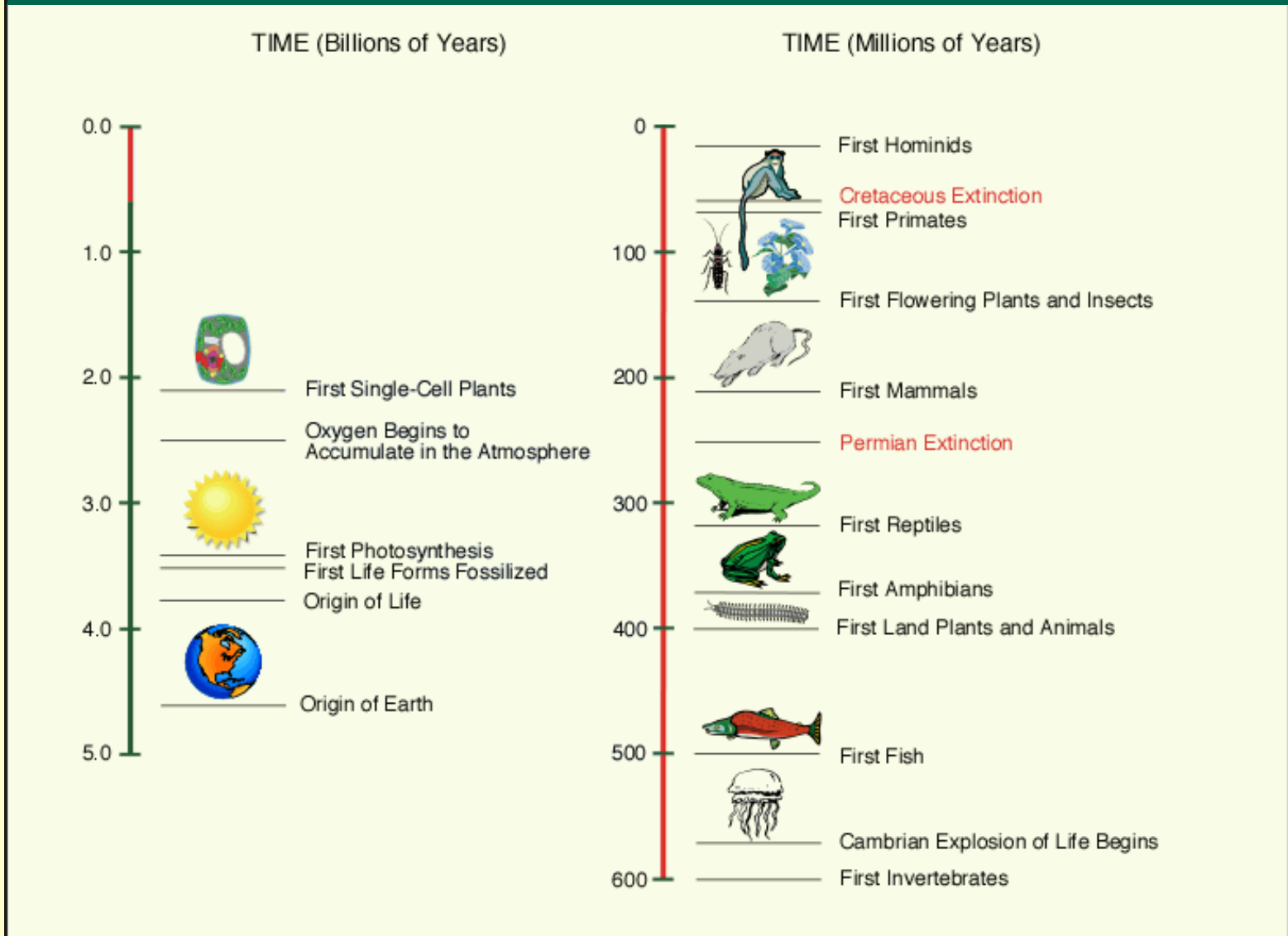
**S = 1.9%,**

**Ti = 0.05%**

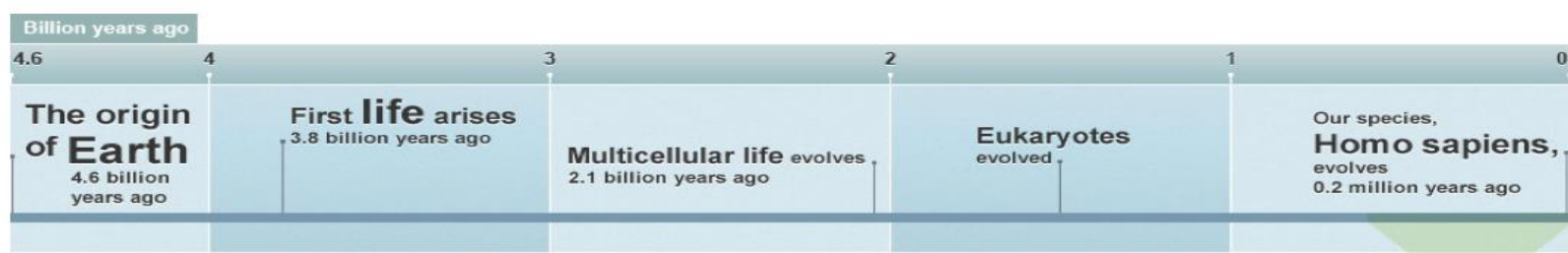
# Earth Fact sheet



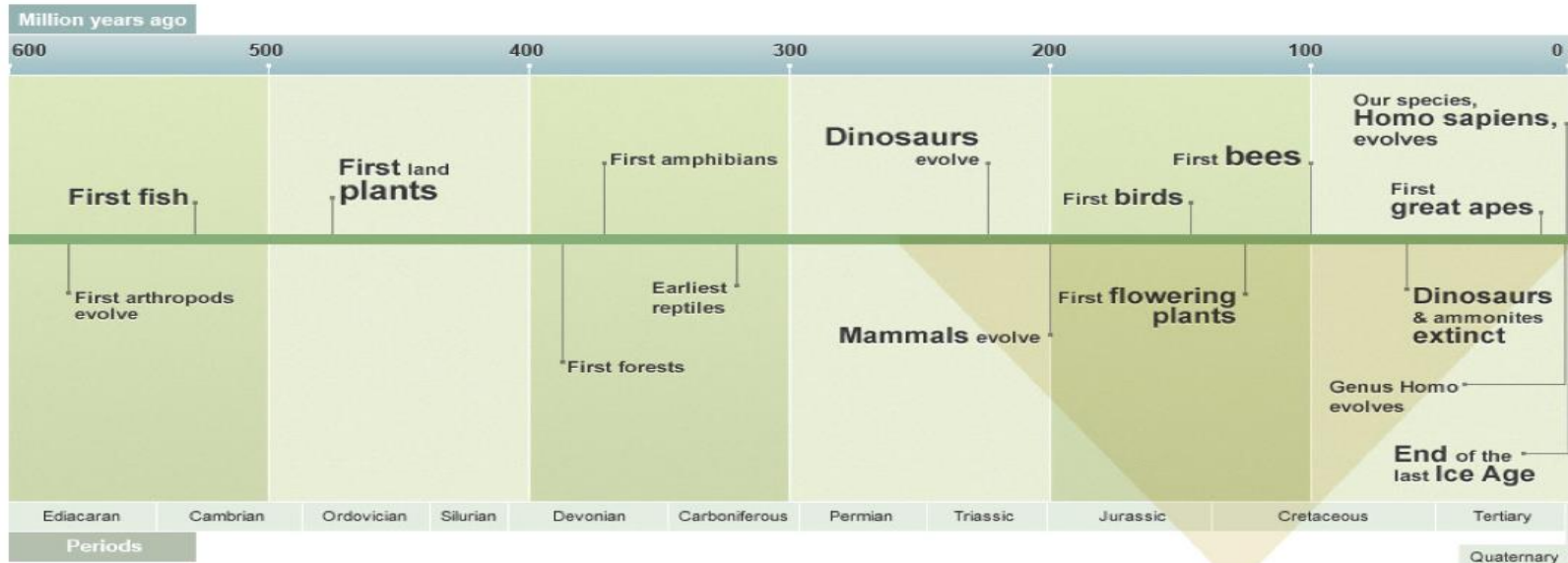
# Origin of life



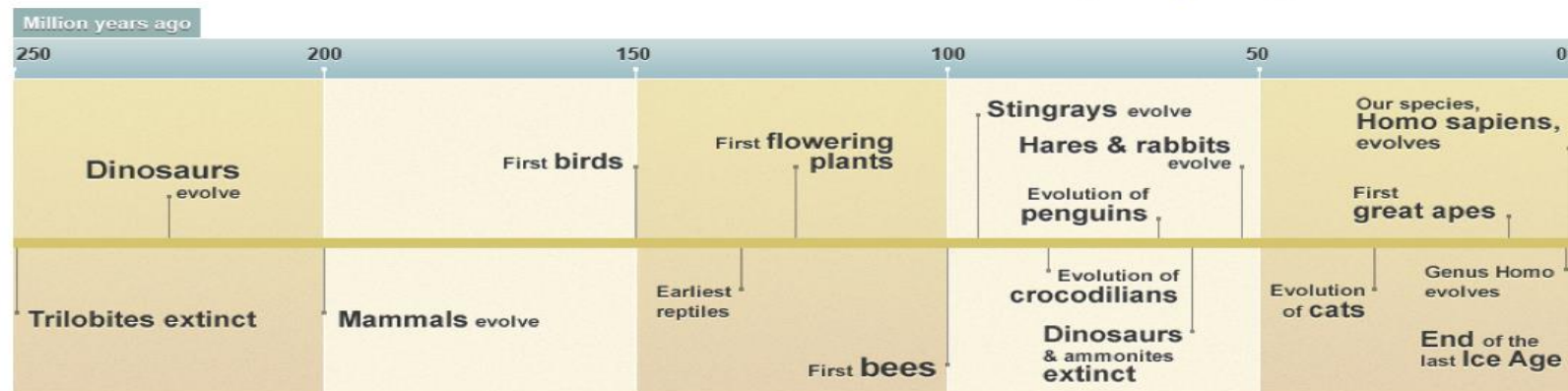
# Life on the earth



Hide last 600 million years



Hide last 250 million years



21 Nov., 2015

# Conclusion remarks

---

- **The earth fact sheet tells us all about our planet earth**
- **There is limited information about other planets, where man has not stepped on and had gathered information through various scientific space missions.**
- **Is there another planet like earth that has either similar or different form of life.**
- **Have we taken care of our planet as our forefathers did?**
- **We have exploited all the resources and polluted the environment for our comfort without caring about coming generation.**
- **Clock is ticking, are we on road to disasters of unprecedented scale due to climatic changes.**

**Did we inherit mother earth from our  
ancestors**

**or**

**We borrowed the planets from our  
children**

**How should we use the resources?**

**Think and act accordingly**