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(IAS Academy by IAS Officers)

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MESSAGE FROM THE DIRECTOR

Dear Aspirant,

This book is dedicated to YOU, the untiring civil service aspirant who has the drive and commitment to persevere towards clearing this exam which is considered as one of the toughest exams in the world.

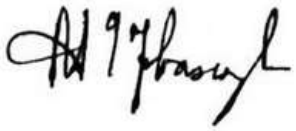
We congratulate you on choosing this book for **"Geography"**. Our attempt here is to simplify important concepts without losing the key points. Hence, we hope you will find this book useful in your civil services journey.

About this book

This book is a distillation of the expertise of the faculty at Officers IAS academy, explained in simple and easy to understand language. What you get to study in this book has been painstakingly collated by our faculty through their years of teaching and mentoring thousands of aspirants.

A strong zeal from you to clear this exam combined with our coaching and textbook will, I am sure help you scale great heights.

I wish you the very best in the most important endeavour of your life.



R. A. Israel Jebasingh

(IAS, 2004 Batch All India Rank 59)

Director of Officers IAS Academy

HOW TO USE THIS BOOK?

Hello Aspirant!

There is a subtle difference between putting in effort and putting in the right & focussed effort. That difference could mean whether you get into the civil services or not!

Aspirants know that the first step to become a Civil Servant is to crack the Preliminary Exam (Prelims) conducted by the UPSC. At first glance, any UPSC Prelims question paper might give the impression that many of the questions asked were 'random', 'remote', 'unexpected', 'out of syllabus', 'from obscure areas' etc.,

But, upon careful consideration one can see that there are some hidden patterns present in the way how some of them were framed. We in the R&D of Officers IAS Academy, understand this.

Our R&D team consists of about 25 members, all of whom have appeared in multiple UPSC Mains & Interviews. This team of veterans spent a year, meticulously combing through the question papers of the past 26 years of UPSC preliminary exams to identify patterns, repetitions & outliers.

The team carefully isolated all such patterns, high-value topics from every subject and has prepared a 'hitlist'. Based on these insights we have prepared books, which we rightfully call as 'Prelims Harvest' books.

Please note: We do not advocate the use of these books as 'Standard' sources. However, instead of reading endless number of books for the UPSC preparation, aspirants can focus on the standard books (NCERTs, etc.,) for the foundational knowledge and then devout the rest of their time in studying the Officers IAS Academy's Prelims Harvest books.

So, please use the Prelims Harvest Books in conjunction with the primary sources (NCERTs, etc.,) and get the best value for your time invested in your UPSC preparation.

Thank you!

R&D Team,
Officers IAS Academy, Chennai.

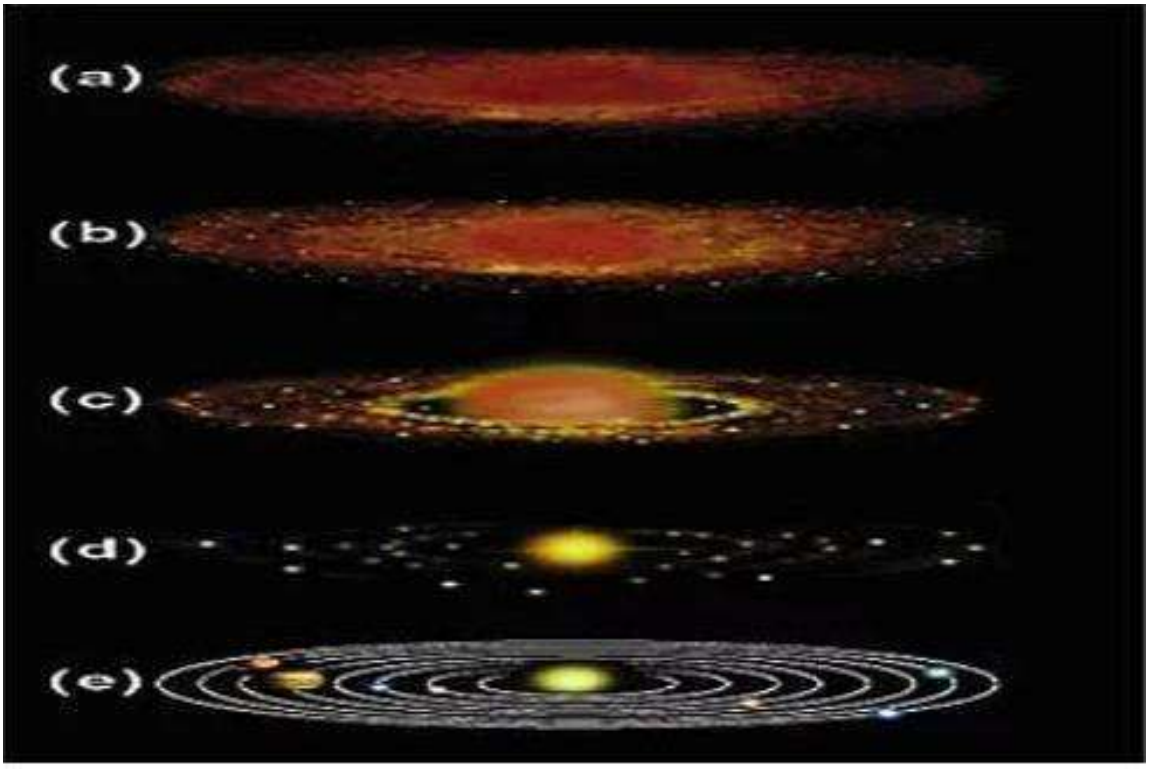
Contents

Physical Geography (The Earth)

Theories on Origin and Evolution of the Earth

- Early theories explained how the earth in the solar system was formed.
- They were,
  - The Gaseous hypothesis of Kant
  - The Nebular Hypothesis of Laplace,
  - The Planetesimal hypothesis of Chamberlin,
  - Russel's binary star hypothesis,
  - Hoyle's supernova hypothesis, and
  - Schmidt's interstellar hypothesis.

The Gaseous hypothesis of Kant



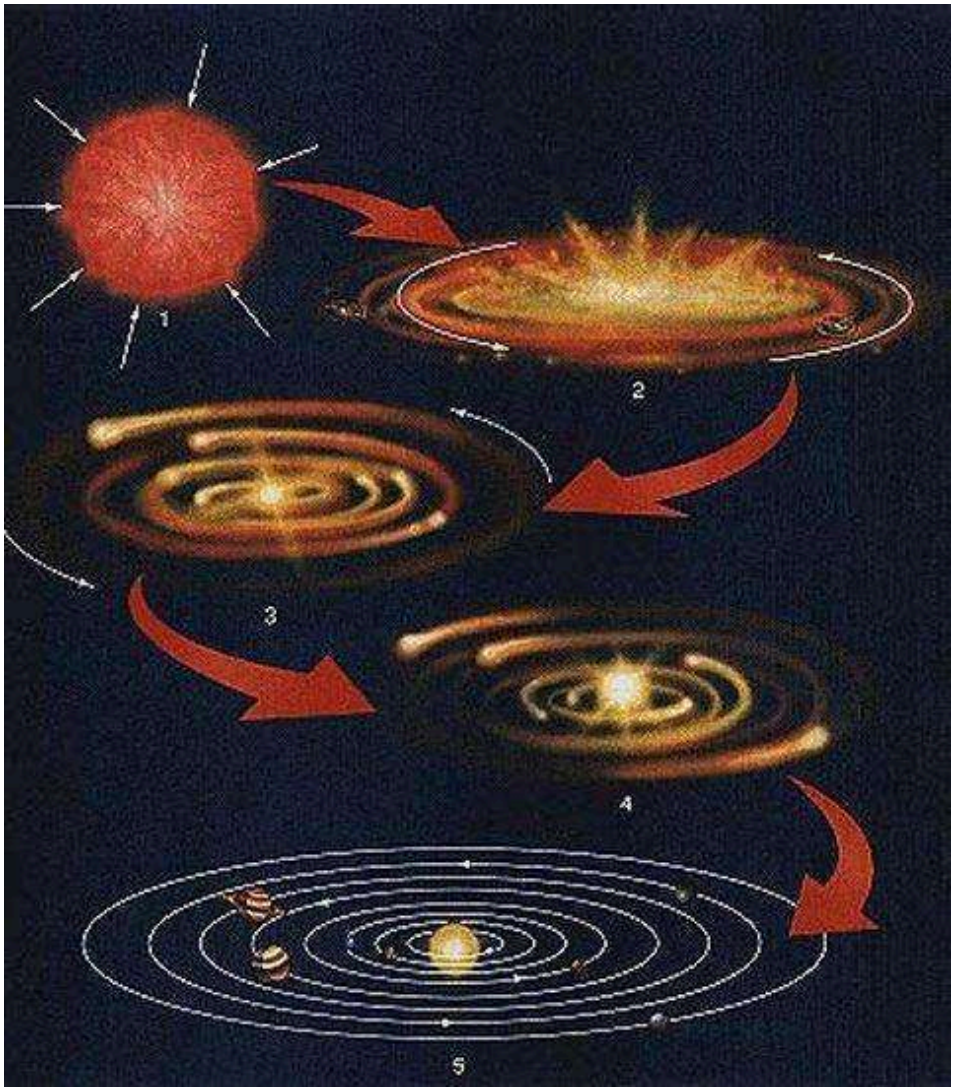
Gaseous Hypothesis

- Immanuel Kant, a German philosopher, presented the Gaseous hypothesis about the origin of the earth in the year of 1755.
- Kant's Gaseous Hypothesis proposes that,

- The Solar System is formed from gas and dust orbiting the Sun.
- It was based on Newton's law of gravity.

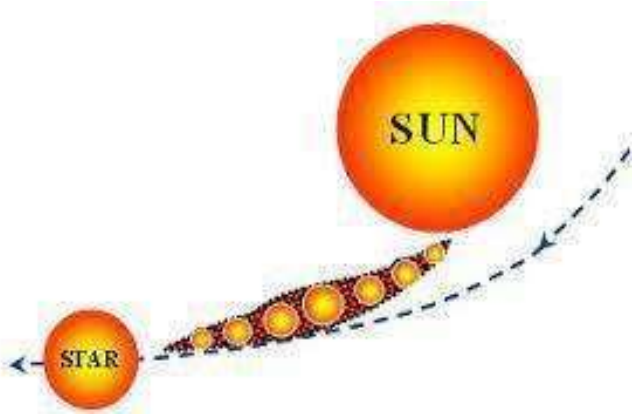
- He believed that primordial matter was initially scattered and consisted of cold, motionless, solid particles.
- It collided with each other due to gravity, which produced heat, which caused angular momentum, and it began rotating.
- As a result, the original cold and motionless cloud of primordial matter evolved into a vast hot nebula.
- It was so vast that it stretched from the sun in the centre to the orbit of the farthest planet. The change in **temperature** transformed primordial matter from solid to gaseous.

The Nebular Hypothesis of Laplace



- Mathematician Laplace revised Kant's theory in 1796.
- It is known as Nebular Hypothesis. According to this,
    - The planets were formed out of a cloud of material associated with a youthful sun, which was slowly rotating.
- The Sun was encircled by a solar nebula made up primarily of hydrogen, helium as well as dust.
- The development of a disk-shaped cloud is caused by particle impact and friction.
- Planets were formed from material associated with the young sun as a result of the accretion process.

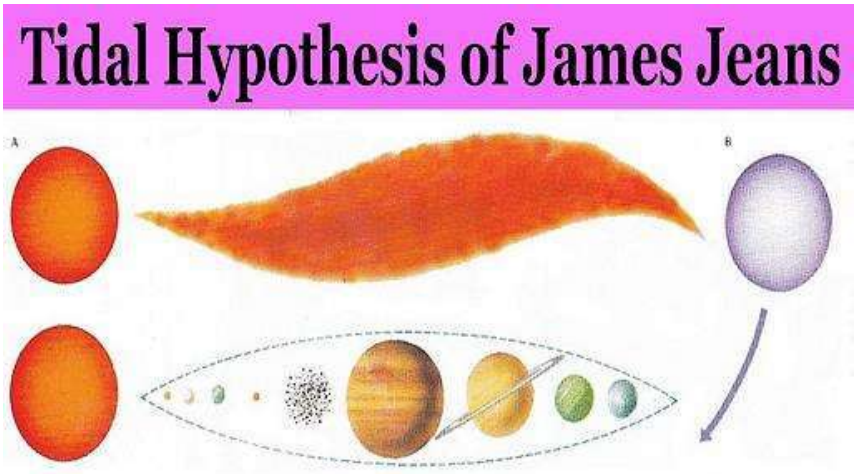
The Planetesimal hypothesis of Chamberlin



- Later in 1900, Chamberlin and Moulton considered that a wandering star approached the sun.
- As a result, a cigar-shaped extension of material was separated from the solar surface.
- As the passing star moved away, the material separated from the solar surface continued to revolve around the sun and it slowly condensed into planets.

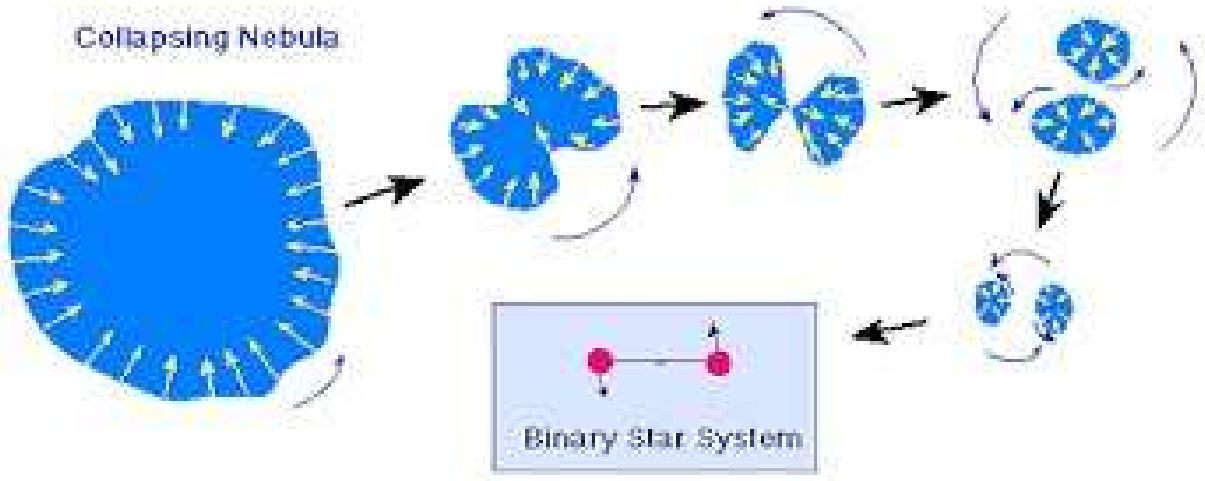
Jean and Jeffery's Tidal Theory

- The gravitational force of two stars has resulted in the formation of our solar system.
    - Primitive Sun, is the early stage of the sun.
    - Intruding Star, in comparison to the primitive sun, it was much larger.
- When intruding stars pass close enough to the primitive sun, hot gas tides rise.
- Cigar-shaped hot gaseous particles were separated from the primordial sun when the intruding star was closest to it.
- The filament is referred to as cigar shaped, because the filament's central part was bulgy and had more gas material, bigger planets like Jupiter and Saturn were formed.
- On both sides of the filament, smaller planets were produced.



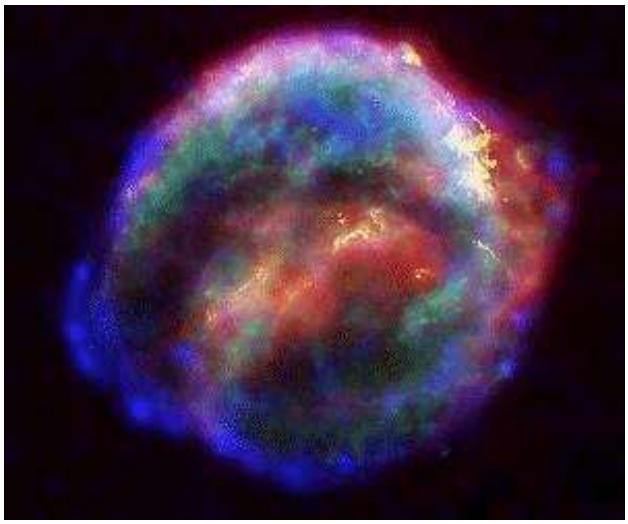
Russel's binary star hypothesis

- American astronomer Prof. H.N. Russel hypothesized in 1937 that,
  - The sun was a binary star or twin-star system, which indicates that the sun has a companion star.
- The existence of binary stars, the bigger one of which ejected mass under the influence of a third one coming close at higher speed, leading to the formation of planets.
- The planets were closer together at first and satellites were formed as a result of their mutual gravitational attraction.



Hoyle's supernova hypothesis

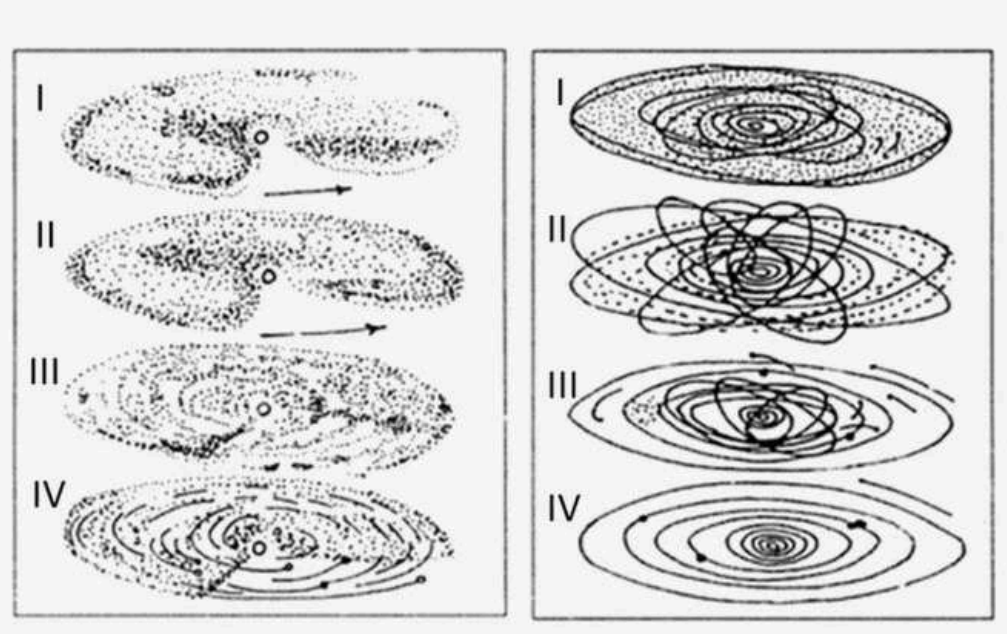
- In 1946, Fred Hoyle proposed this theory,
  - The sun used to be twinned with another star, which burst due to nuclear processes that transformed lighter components into heavier ones.



- The companion star's explosion produced a cloud of incandescent gases, which he refers to as the 'Supernova stage'.
- As the nucleus receded far away, the sun's gravitational power kept this gaseous cloud and the rest of the star together.
- The gaseous cloud at the supernova stage contains iron and other earth elements.
- The earth, as well as other planets and satellites, were formed from these particles.
- They revolved around the sun because they were in the sun's gravitational field
- It gradually cooled to the solid form in which the planets and satellites exist today.

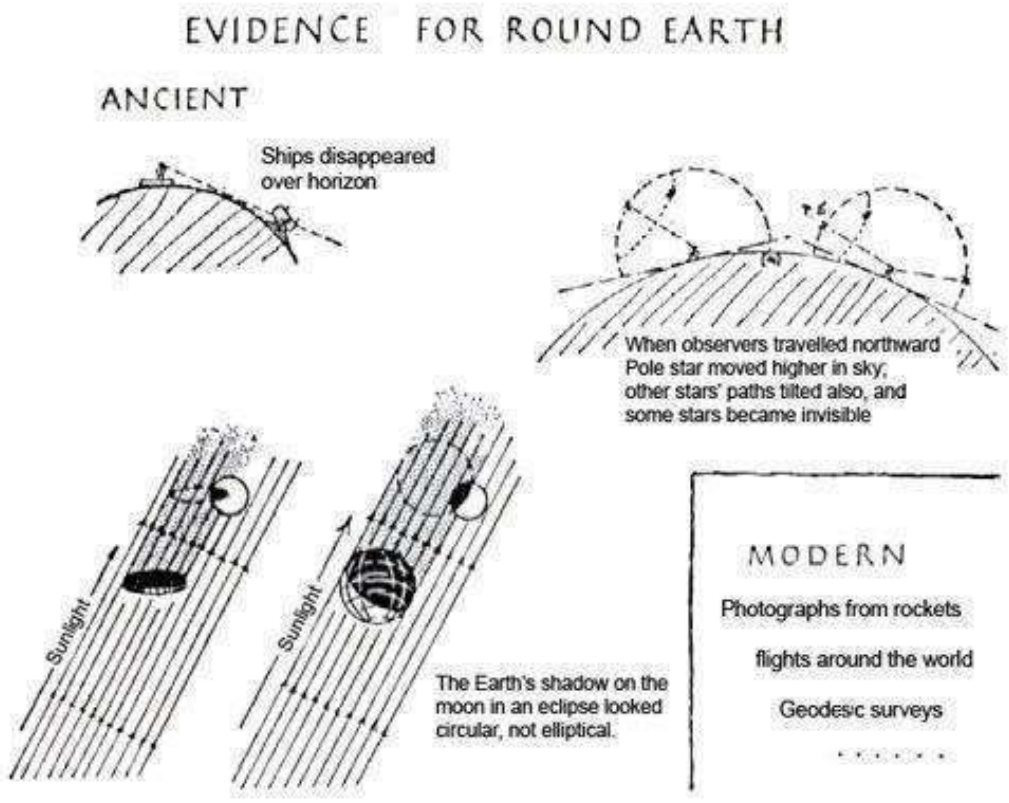
Schmidt's interstellar hypothesis

- According to this theory, the primordial dust began to coalesce into a disk-shaped configuration as it moved at a high pace.
- These disk-shaped nebulae were further subdivided into rings, each holding asteroids that eventually merged into planets.



Aristotle's- On the Heaven

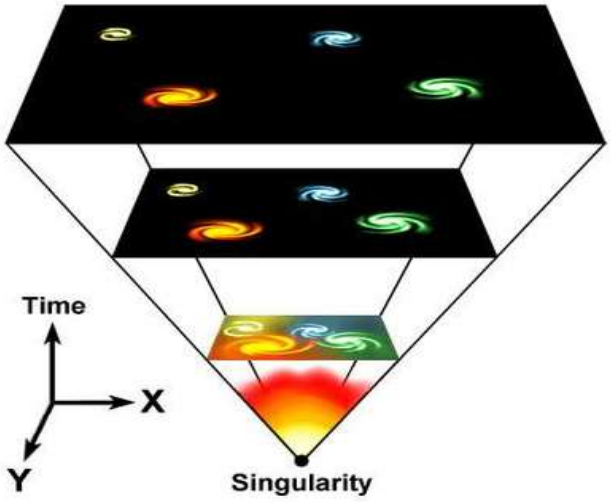
- Aristotle in 340 B.C first stated that,
    - The earth was spherical in his book "On the Heaven".
- Since ancient times, mankind has pondered about the geometrical shape of our planet Earth.
- Aristotle (384-322 BC) was among the first to recognize the fact of our planet being a round sphere.
- He observed lunar eclipses and noticed that only a round sphere could imply a circular shadow.
- This astronomical observation was confirmed by general observations made at sea.
    - When a ship sails away from the coast, it seems to disappear gradually behind the horizon.



The Big Bang Theory

- It is the modern prevailing theory regarding the origin of the universe.

- It's also called the Expanding Universe Hypothesis.
- Edwin Hubble in 1920, provided evidence that the Universe is constantly expanding,
    - He stated that the universe expanded from an initial single state of very high density and temperature.
- According to the big bang theory, all of the matter that made up the universe resided in a single location which has,
    - A volume smaller than an atom,
    - An extremely high temperature and
    - An infinite density
- The theory suggests that the Universe, at some point in time, was condensed into a single particle,
    - Later, it started expanding infinitely after a huge explosion.
    - This gave birth to nebulae that in turn, coalesced into stars and planets.
- The science community unanimously agrees over the age of the Universe to be around 13.7 billion years.
- Around 3 lakh years after the big bang, the universe turns transparent due to the production of atomic matter.
- After Edwin Hubble proposed the constant expansion of the Universe, another Belgian cosmologist came up with the Big Bang Theory in 1931.

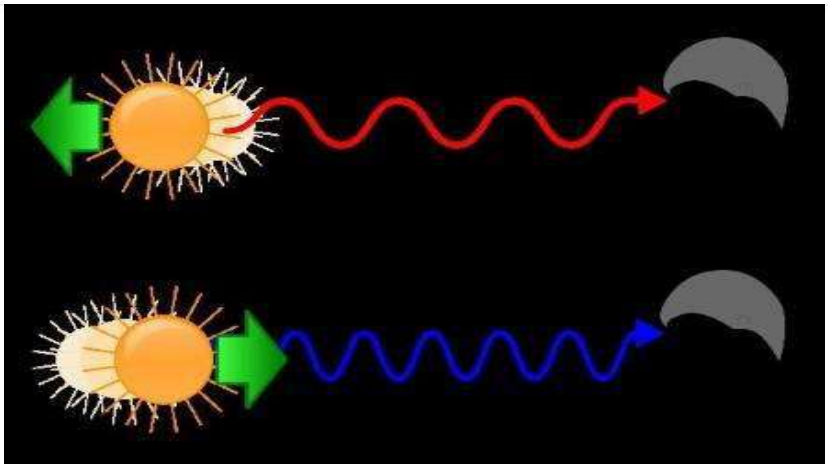


Is the Universe really expanding?

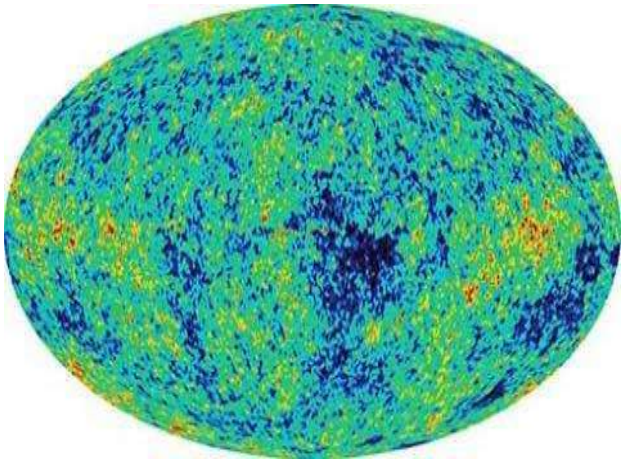
- Doppler shift /Red shift and Blue shift describe,

- How light changes as objects in space (such as stars or galaxies) move closer or farther away from us.
- This concept is a key to chart the universe's expansion.

- When an object moves away from us (Doppler-shifted to lower frequencies),
  - The light is shifted to the red end of the spectrum, as its wavelengths get longer.
- If an object moves closer (Doppler-shifted to higher frequencies),
  - The light moves to the blue end of the spectrum, as its wavelength gets shorter.



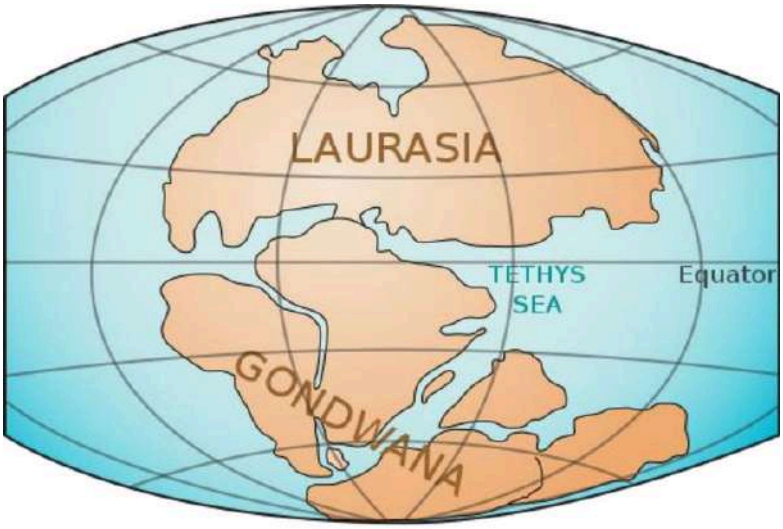
- The redshift phenomenon provides evidence for an expanding universe (galaxies are drifting apart).
- Hubble's law states that,
  - The farther the galaxies are, the faster they are moving away from Earth.
  - Thereby, accelerating the expansion of the universe.



Factors influencing the Evolution of earth

a) Continental drift theory

- It was proposed by Alfred Wegener in 1912.
- The theory deals with the distribution of the oceans and the continents.
- According to Wegener's Continental Drift theory,
    - All the continents were a single continental mass, called a Super Continent Pangaea.
    - A mega ocean surrounded this supercontinent called Panthalassa.
- The Pangaea, began to split some two hundred million years back into two big continental masses known as,
    - Gondwanaland (South)
    - Laurasia (North)



TRIASSIC
200 million years ago

- Later, Gondwanaland and Laurasia continued to break into several smaller continents that exist today.

Evidence in support of the theory

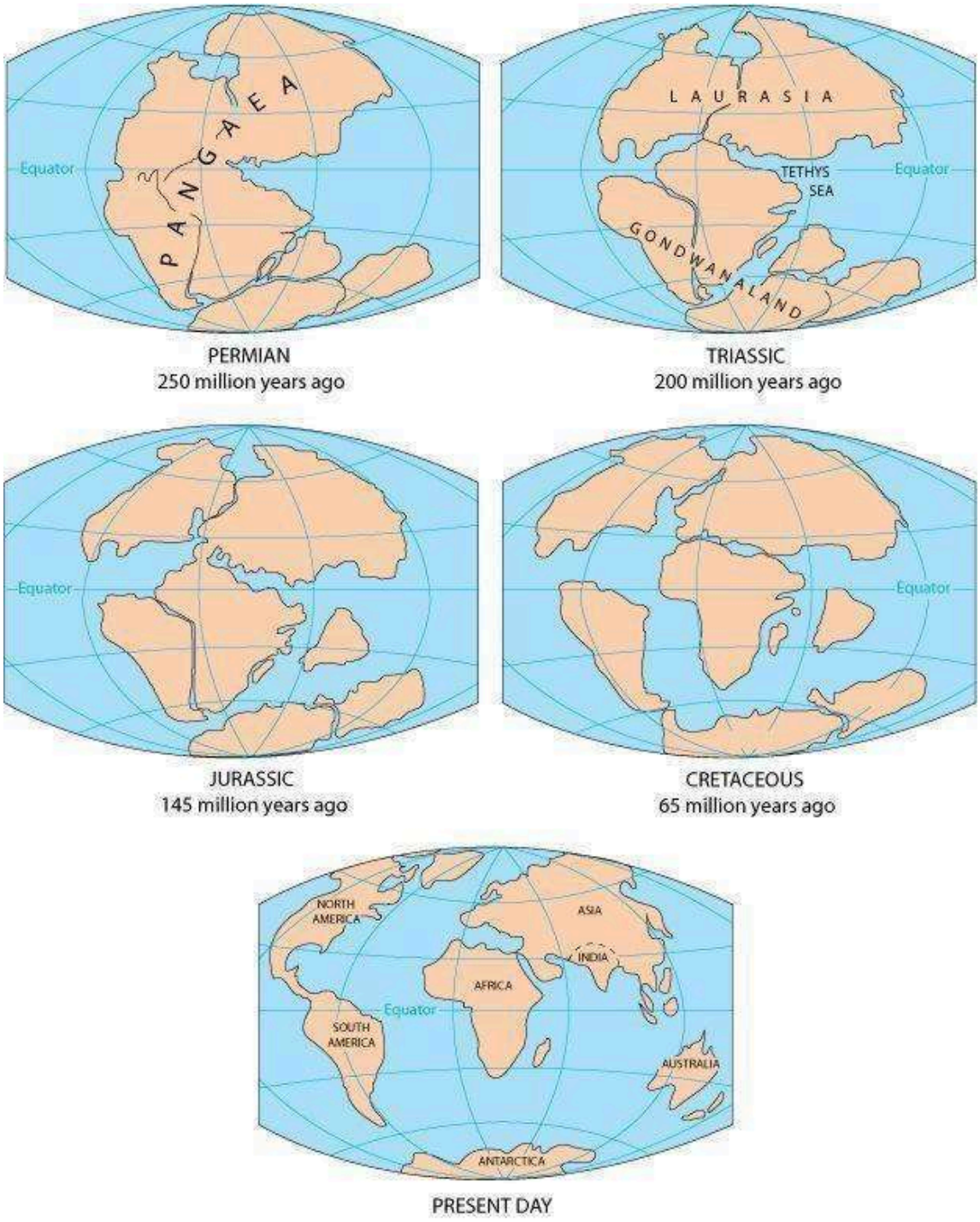
- The matching of continents (Jig-Saw-Fit),
  - The shoreline of Africa and South America.
- Rocks of same age across the Oceans,
  - The ancient rocks from Brazil coast matches with western Africa.
- Tillite (sedimentary rocks of glacial deposits)
  - Gondawana sediments from India are found in the Southern Hemisphere.
- Placer Deposits
  - The occurrence of rich placer deposits of gold in the Ghana coast and the absolute absence of source rock in the region is an amazing fact.
  - The gold bearing veins are in Brazil and it is obvious that the gold deposits of Ghana are derived from the Brazil plateau when the two continents lay side by side.
- Distribution of Fossils
  - The skeletons of Mesosaurus are found only in two localities, 4,800km apart with an ocean in between at present.
    1. The Southern Cape province of South Africa and
    2. Iraver formations of Brazil.

Factors responsible for drifting of continents

- The movement responsible for the drifting of the continents was caused by,
    1. Pole fleeing force,
    2. Tidal force.
- Polar fleeing force relates to the rotation of the earth.
- Tidal force is due to the attraction of the moon and the sun that develops tides in oceanic waters.
- Wegener believed that these forces would become effective when applied over many million years.
- However, most scholars considered these forces to be totally inadequate.

b) Glacial cycle

- A glacier is a large, perennial accumulation of crystalline ice, snow, rock, sediment and water.
- It originates on land and moves down slope under the influence of its own weight and gravity.
- It affected the evolution of life on earth as many species were not able to tolerate extremely cold weather and became extinct.
- The rising sea level affected many organisms.
- They are sensitive indicators of changing climate.



Factors responsible for bringing dynamic changes on Earth Surface

a) Electromagnetic radiation

- Electromagnetic radiation is an electric and magnetic disturbance traveling through space at the speed of light.
- It contains neither mass nor charge.

- Some of the examples of EMR are,
    - Radio waves, Microwaves, Infrared, Ultraviolet, Gamma, X-rays.

Source

- Sources of Electromagnetic Radiation are,
    - Cosmos (Sun and Stars)
    - Radioactive elements,
    - Manufactured devices.

Causes

- The cause of electromagnetic radiation bringing dynamic changes on the earth surface,
    - Temperature change,
    - Evaporation of water,
    - Precipitation,
    - Formation of metamorphic rocks.

b) Geothermal energy

- Geothermal energy is heat that is generated within the Earth's core.
- It is a renewable resource that can be harnessed for use as heat and electricity.
- Energy within the earth surface which results in endogenic forces.
- Thus, altering the crust of earth.

c) Gravitational force

- It's a directing force, which activates the downslope movements of matter causing stresses on earth's material.
- Examples such as, Avalanche and Mass Movement.

d) Plate movements/ Plate Tectonics

- It's the movement and interaction of Earth plates.
- It includes many phenomena such as,
    - Mountain building process,
    - Volcanoes,
    - Earthquakes.
- Due to which the major landforms are created.

e) Rotation of the earth

- Earth's rotation causes pressure differences and movements of winds.

- Winds are associated with phenomena like ocean currents, rainfall.

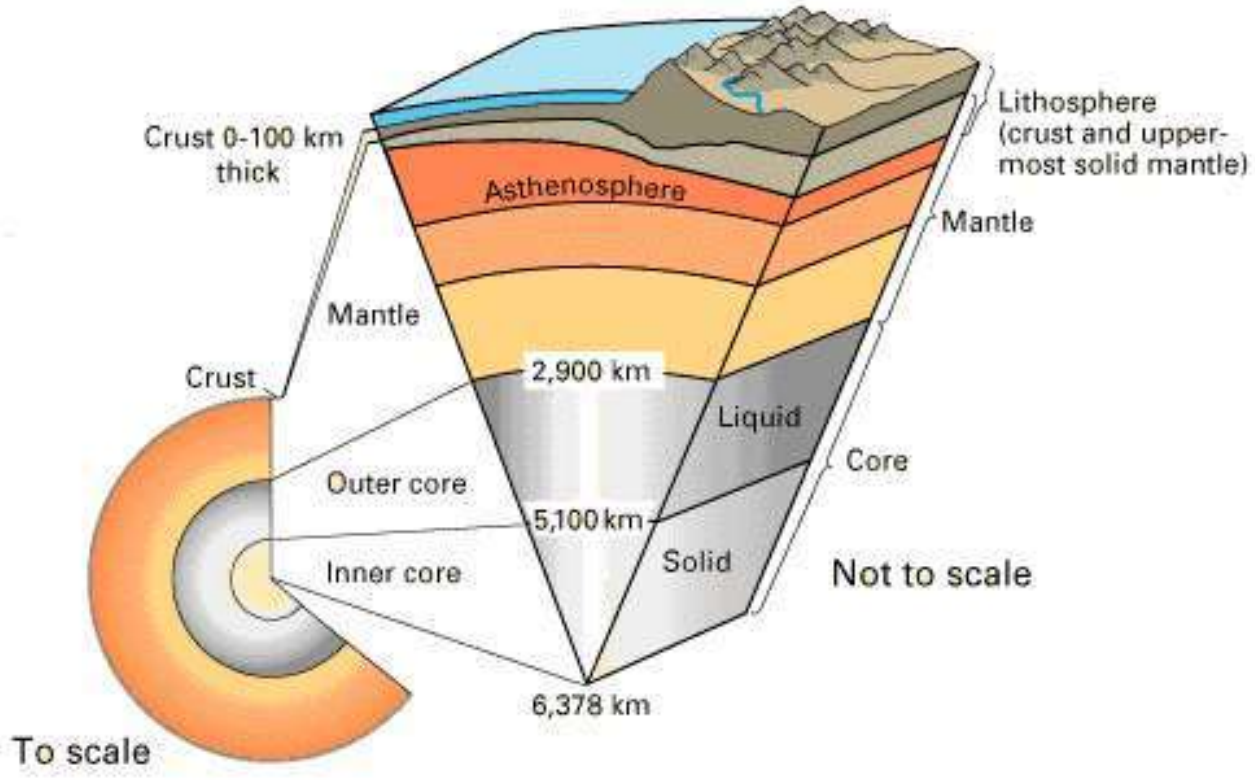
f) Revolution of the earth

- Earth's revolution around the sun is influenced by the gravitational force of the sun.
- It results in tidal movements.

Interior of the Earth

a) Composition of the Earth

- The interior of the earth is composed of three concentric layers,
  - The Crust,
  - The Mantle,
  - The Core.



The Crust

- The crust is the solid outermost layer of the earth.
- It's composed of rocks and minerals.
- It is the thinnest of all layers.

FOR FULL BOOK,

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