

# Zoogeography

# Introduction

- Zoogeography - the scientific study of distribution of animal life on earth and factors controlling it.
- An interdisciplinary branch contributed by:
  - Zoology
  - Geography
  - Ecology
  - Geology
  - Paleontology
  - Evolution
  - Systematics etc



# Introduction

## Zoogeography helps to understand:

- The causes, factors and patterns of past and present distribution of animals.
- The distribution of animals on the earth's surface can be discussed under different headings viz., **geological distribution, ecological distribution & geographical distribution.**
  - Geological distribution - distribution of animals over time i.e., from the time of origin of life to the present.
  - Ecological distribution - the distribution of animals in different habitats.
  - Geographical distribution - distribution of animals in different continents. The study of distribution of animals in geographically defined areas is known as **chorology**.

# Introduction

## Zoogeography helps to understand:

- The nature of ancient climates, land masses, land connections, barriers, continental drifts, island patterns and geologic changes.
- The type of animal movement, dispersal, competition and survival
- The causes of dominance of certain species at certain places, their subsequent disappearance, extinction and final replacement by diverse groups.
- The process of organic evolution, especially of isolated species.

# Origin of Oceans and Continents

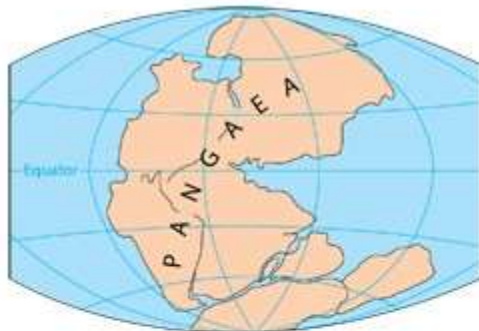
- In order to explain the present day distribution of animals over the earth's surface explicitly, it is a prerequisite to understand how continents and oceans have originated.
- Two theories have been proposed:
  - Theory of Continental drift
  - Plate Tectonics Theory

## Theory of continental drift:

- Proposed by a German Geophysicist and meteorologist - Alfred Lothar Wegner (1880-1930).
- Proposed the theory In 1912 - stating that all the continents were once joined together in a single land mass and have later drifted apart.
- He supposed that the cause might be the centrifugal force of the earth's rotation.

# Origin of Oceans and Continents

- In 1915, in his book 'The origin of Continents and Oceans' Wegner published the continental drift theory that there had once been a single giant land mass which he called **Pangaea** (Greek- meaning All Lands or All Earths).



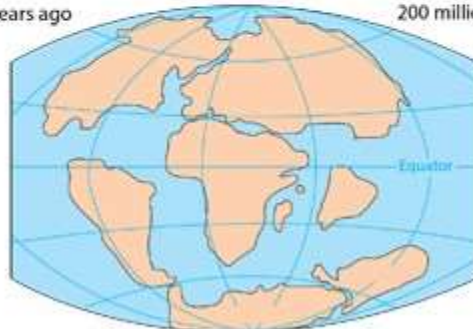
PERMIAN  
250 million years ago



TRIASSIC  
200 million years ago



JURASSIC  
145 million years ago



CRETACEOUS  
65 million years ago

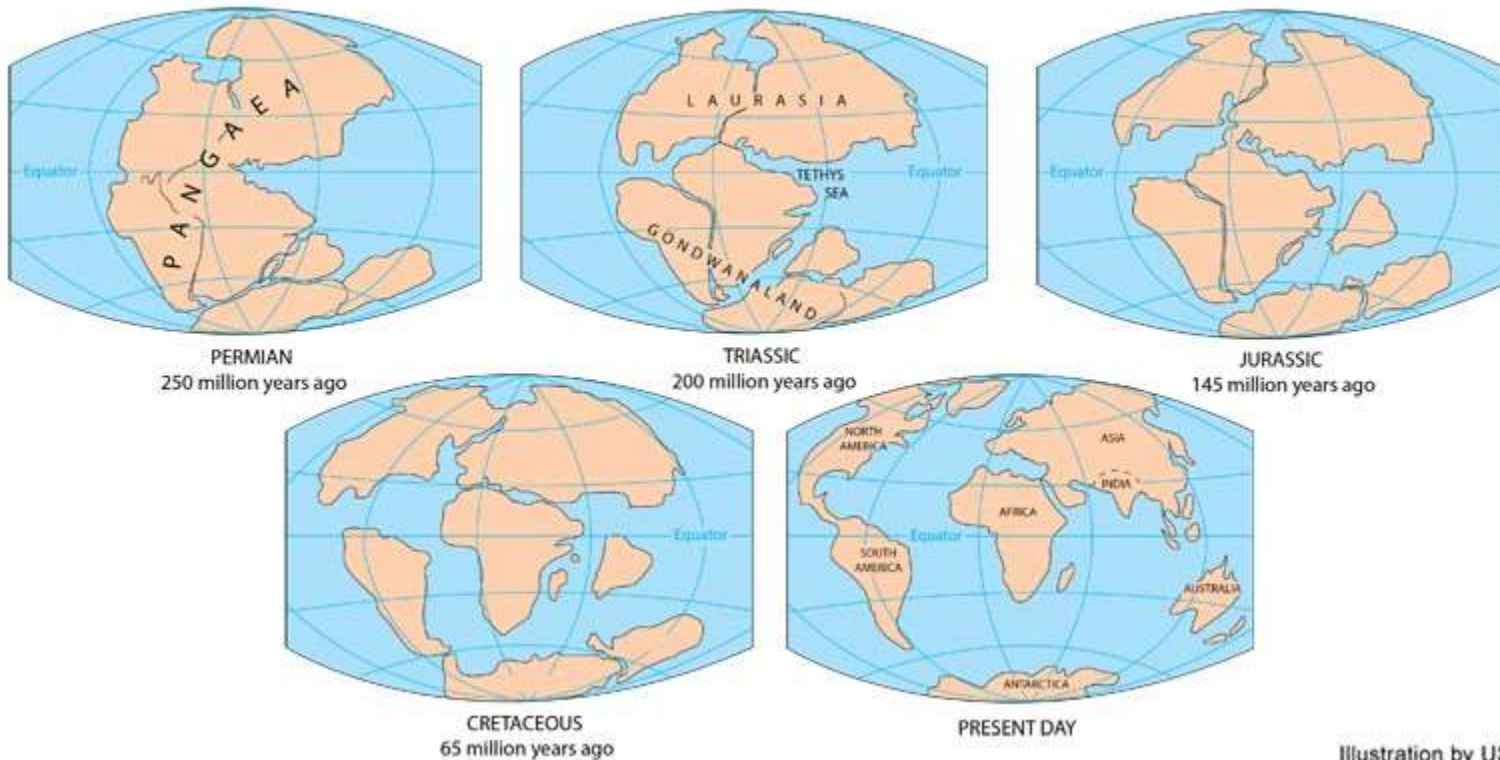


PRESENT DAY

Illustration by USGS

# Origin of Oceans and Continents

- It was based on his observations that the earth's crust is like a giant jigsaw puzzle.
- The continental shelf of the Americas fit closely to Africa and Europe. Similarly the continental shelf of Antarctica, Australia, India and Madagascar fit next to the tip of Southern Africa.



# Origin of Oceans and Continents

- About 125 million years ago this enormous land mass separated into two huge land masses - **Laurasia and Gondwanaland**.
- These two masses started drifting apart. After about 65 million years, Laurasia gave birth to the present day continents of North America, Europe and Asia



PERMIAN  
250 million years ago



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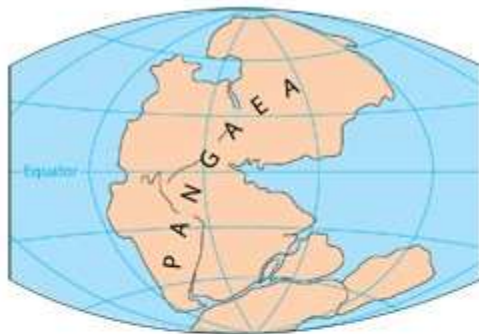


PRESENT DAY



# Origin of Oceans and Continents

- Gondwanaland became, what is now South America, Africa, Australia and Antarctica.
- Alex du Toit (1937) - a South African scientist put together masses of such supporting evidences in his publication '**Our Wandering Continents**'.



PERMIAN  
250 million years ago



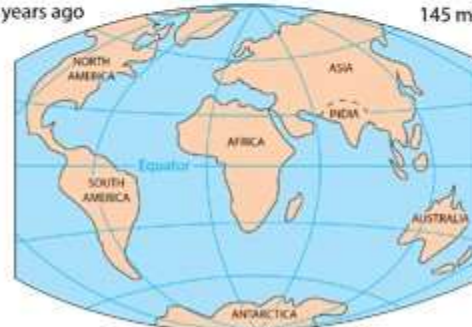
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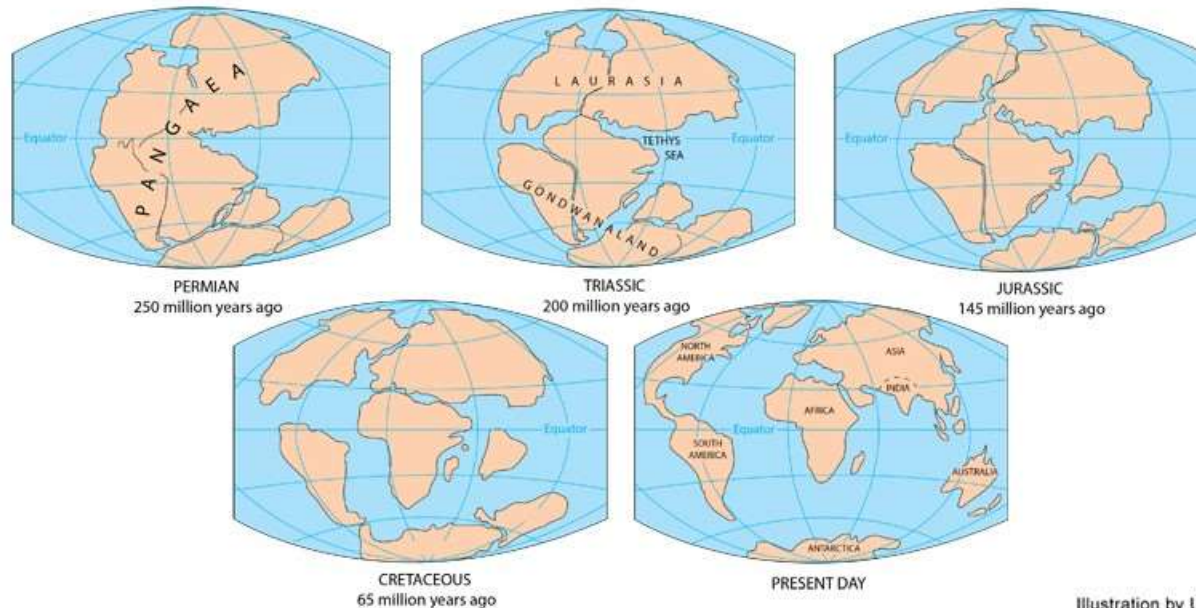
CRETACEOUS  
65 million years ago



PRESENT DAY

# Origin of Oceans and Continents

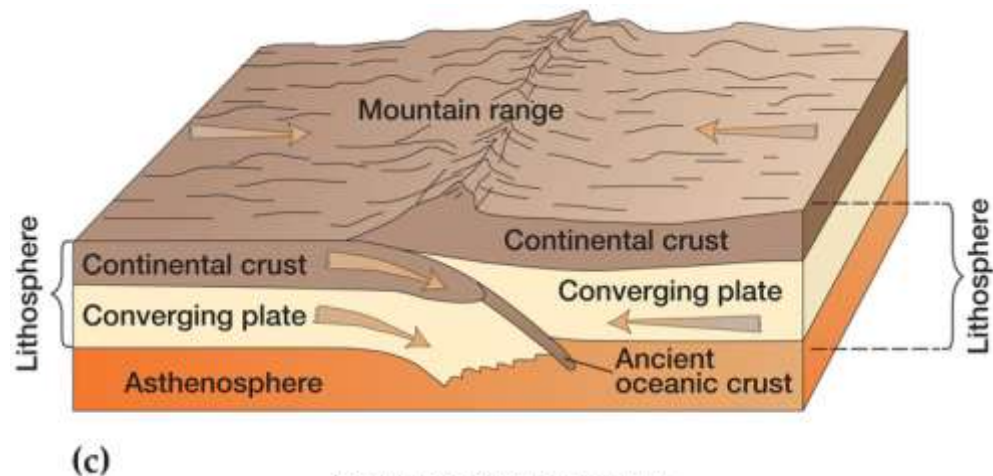
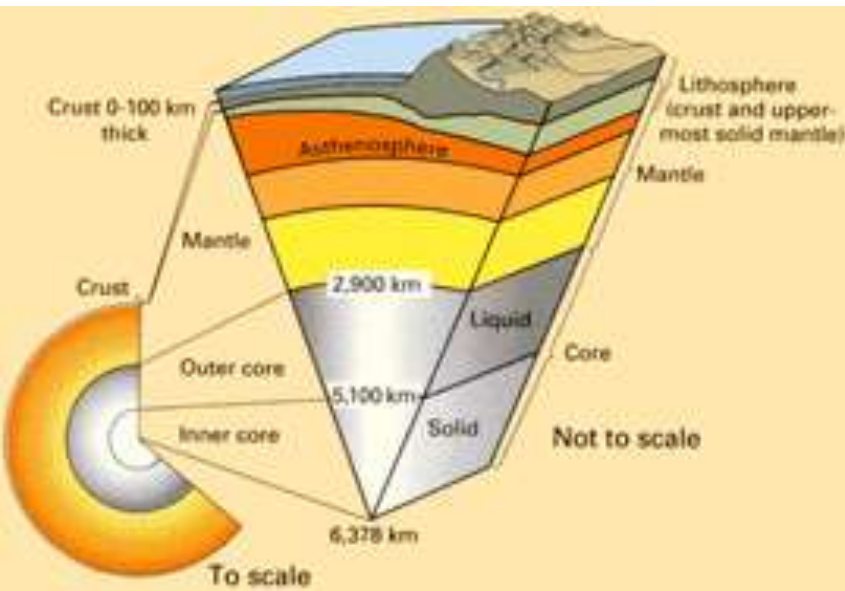
- Continental drift theory has been proved by ocean researches.
- Study of fossils has also given supporting evidences.
  - Fossils of the extinct plants and reptiles discovered in Antarctica have led paleontologists to believe that Antarctica was a warm continent before it drifted to its present position around the South Pole.



# Origin of Oceans and Continents

## Plate Tectonics Theory:

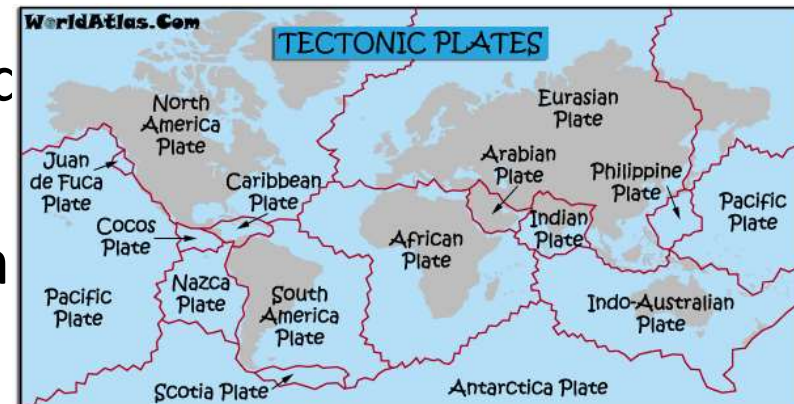
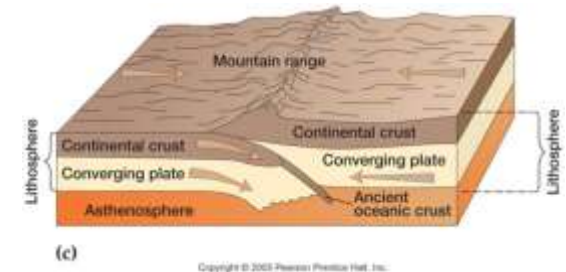
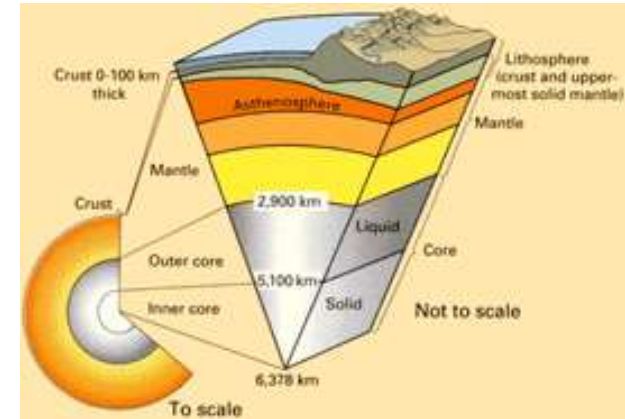
- Plate tectonics is a scientific theory which describes the large scale motions of earth's lithosphere.
- American geophysicists Harry H. Hess & Robert S. Dietz (1960) played a pivotal role in the development of the modern theory of plate tectonics.



# Origin of Oceans and Continents

## Plate Tectonics Theory: Key Principles

- The outer layers of earth are divided into lithosphere and asthenosphere
- Mechanically the lithosphere is cooler and more rigid; asthenosphere is hotter and flows more easily
- The lithosphere is broken up into 7-8 major tectonic plates and many minor plates
- The separate and distinct tectonic plates of lithosphere ride on the fluid like visco-elastic asthenosphere.
- Plate motions range up to 10-40 mm per year to 160 mm per year.



# Origin of Oceans and Continents

## Plate Tectonics Theory:

- Modern researches have revealed that the continents are drifting even today and the continents known today will look very different after 50 million years.
- Indian subcontinent is moving at a rate of 4.5 meters every 100 years towards north.
- Similarly Africa and the Americas will be even farther away from each other. North and South America will get separated and Australia will have moved farther northwards

