

# Unit 10- Phytogeography

4<sup>th</sup> semester

North Gauhati college

# Introduction

- **Phytogeography** (from Greek phytón = "plant" and geographía = "geography" meaning also distribution) or **botanical geography** is the branch of biogeography that is concerned with the geographic distribution of plant species and their influence on the earth's surface.
- It explains the distribution of plants in the past, evolution of present day plants from ancient flora and distribution pattern of present-day plants.

- In 1806, Alexander Von Humboldt had made a notable contributions to describe the geographical distribution of plants. So he is known as the **father of plant geography**.

Two major divisions of phytogeography –

1. **Descriptive or static phytogeography**: deals with the actual description of floristic or vegetational groups found in different parts of the world.
2. **Interpretive or dynamic phytogeography** : This deals with the dynamics of migration and evolution of plants and floras. It explains the reasons for varied distribution of plant species in different parts of the world.

# Principles of phytogeography

- The ideas which help to explain the geographical distribution of plants on the earth are called as principles of Phytogeography or principles of interpretive phytogeography.
- Lowerence (1951) has suggested the following thirteen modern principles of Phytogeography which are classified into four groups:
  - Principles concerning environment
  - Principles concerning plant responses
  - Principles concerning the migration of floras and climaxes
  - Principles concerning the perpetuation and evolution of floras and climaxes

## I. Principles concerning environment:

1. The distribution of plants is primarily controlled by climatic conditions.
2. There has been variation in climate during geological history in the past which affected migration of plants.
3. The relations between land masses and seas have varied in the past. The large land masses split up to form new land masses or continents which separated and reoriented. Land bridges between continents acted as probable routes for migration of plant and animal species. The land bridges became submerged in sea with the passage of time and the possibility for migration of plants and animals from one continent to another disappeared for ever.

4. Soil conditions on plains and mountains of different land masses show secondary control on distribution of vegetation. Halophytes, psammophytes, calcicols, calcifobs etc. have developed because of edaphic conditions.
5. Biotic factors also play important role in distribution and establishment of plant species.
6. The environment is holocentric, i.e., all environmental factors have combined effects on the vegetation of a place (Ale & Pank, 1939).

## II. Principles concerning plant responses:

7. Range of distribution of plants is limited by their tolerances. Each plant species has a range of climatic and edaphic conditions. Therefore, tolerance of a large taxon is the sum of tolerances of its constituent species.
8. Tolerances have a Genetic basis. The response of plants to environment is governed by their genetic makeup. Many of the crops through breeding and genetic changes have been made to grow in wider range of environmental conditions. In nature, hybrid plants have been found to have wider range of tolerances than their parents.

9. Different ontogenetic phases have different tolerances. Different developmental stages of plants show different degree of tolerances, as for example seeds and mature plants are more tolerant to temperature and moisture variations than their seedlings.



### III. Principles concerning the migration of floras and climaxes:

10. Large scale migrations have taken place. The fossils and palaeoecological evidences reveal that large scale migrations of plants and animals have taken place during Mesozoic era and Tertiary periods.
11. Migration resulted from transport and establishment. In the process of migration plants are dispersed to new habitats through their propagules such as spores, seeds, bulbils etc., and there they are established if environmental conditions are favourable. Plants grow and reproduce there and progeny perpetuates through ecological adjustments.

## IV. Principles concerning the perpetuation and evolution of floras and climaxes:

12. Perpetuation depends first upon migration and secondly upon the ability of species to transmit the favourable variations to the progenies.
13. Evolution of floras and climaxes depends upon migration, evolution of species and environmental selections.

# Theory of Continental drift

- The theory of continental drift was propounded by Wegner (1912 1924)
- According to him the whole land- mass of the world was a single super continent during Palaeozoic era. He named it as Pangaea. That super continent was surrounded by sea on all the sides which was named Panthalassa. During Mesozoic, Pangaea split up into two large landmasses; Laurasia in the north and Gondwanaland in south.

- The two landmasses were separated by Tethys Sea. Du Toit (1937), however, suggested that Laurasia and Gondwanaland existed from the very beginning. The two large landmasses having characteristic flora and fauna broke up into new landmasses called continents. Laurasia gave rise to Eurasia, Greenland and North America and similarly Gondwanaland gave rise to South America, Africa, India, and Polynesia, Australia Antarctica etc.

- About 135 million years ago reorientation of continents began. The continents were drifted apart by the oceans. This is called Continental Drift. The occurrence of Dinosaurs and many fossil plants lend support to the existence of Laurasia and Gondwanaland. With the separation of continents the distribution areas of several plant and animal species got separated and gave rise to discontinuous distribution areas.



225 million years ago



150 million years ago



100 million years ago



Earth today



***Cleome monophylla***

It is found in India and Africa