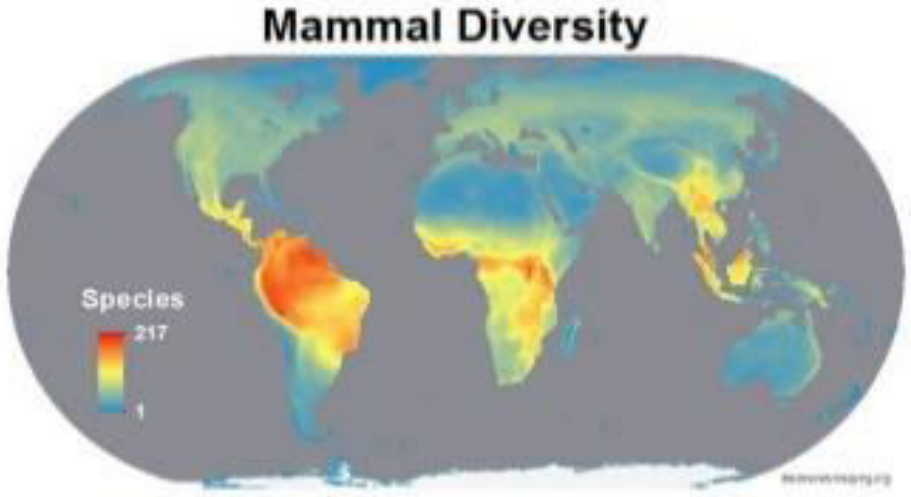
Biogeography

Biogeography: the study of the distribution of species and ecosystems in geographic space and through geological time.

Zoogeography: the branch of the science of biogeography that is concerned with the geographic distribution (present and past) of animal species. (Fauna)

Phytogeography: the branch of biogeography that is concerned with the geographic distribution of plant species and their influence on the earth's surface. (Flora)



phytogeography

According to Croizat (1952), Phytogeography is the study of migration and evolution of plants in time and space.

According to Campbell (1926), the main theme of plant geography is to discover the similarities and diversities in the plants and floras of the present and past found in widely separated parts of the earth.

Wulff (1943) states that Phytogeography is the study of distribution of plant species in their habitats and elucidation of origin and history of development of floras.

Phytogeography (from Greek φυτό, *phyto* = plant and γεωγραφία, "geography" meaning also distribution) is the branch of biogeography that is concerned with the geographic distribution of plant species and their influence on the earth's surface. Phytogeography is concerned with all aspects of plant distribution, from the controls on the distribution of individual species ranges (at both large and small scales, see species distribution) to the factors that govern the composition of entire communities and floras. Geobotany, by contrast, focuses on the geographic space's influence on plants.

Phytogeography has a long history. One of the subjects earliest proponents was Prussian naturalistAlexander von Humboldt, who is often referred to as the "father of phytogeography". Von Humboldt advocated a quantitative approach to phytogeography that has characterized modern plant geography.

Gross patterns of the distribution of plants became apparent early on In the study of plant geography.

For example, Alfred Russel Wallace, co-discoverer of the principle of natural selection, discussed the Latitudinal gradients in species diversity, a pattern observed in other organisms as well. Much research effort in plant geography has since then been devoted to understanding this pattern and describing it in more detail.

Research in plant geography has also been directed to understanding the patterns of adaptation of species to the environment. This is done chiefly by describing geographical patterns of trait/environment relationships. These patterns termed ecogeographical rules when applied to plants represent another area of phytogeography. Recently, a new field termed macroecology has developed, which focuses on broad-scale (in both time and space) patterns and phenomena in ecology. Macroecology focuses as much on other organisms as plants.

Phytogeography is often divided into two main branches: ecological phytogeography and historical phytogeography. The former investigates the role of current day biotic and abiotic interactions in influencing plant distributions; the latter are concerned with historical reconstruction of the origin, dispersal, and extinction of taxa. Floristics is a study of theflora of some territory or area. Traditional phytogeography concerns itself largely with floristics and floristic classification.

Major Divisions of Phytogeography:

There are two major divisions of Phytogeography:

(i) Descriptive or Static Phytogeography

(ii) Interpretive or Dynamic Phytogeography

Descriptive Phytogeography

This deals with the actual description of floristic or vegetational groups found in different parts of the world. Early plant geographers described floras and attempted to divide earth into floristic and botanical zones.

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. It is a borderline science involving synthesis and integration of data and concepts from several specialized disciplines like ecology, physiology, genetics, taxonomy, evolution, palaeontology and geology. Good (1931), Mason (1936), Cain (1944) and some others have pointed out the factors involved in the distribution of plants.

Lowerence (1951) has suggested the following thirteen

Modern principles of Phytogeography

which are classified into four groups

I. Principles concerning environment

II. Principles concerning plant responses

III. Principles concerning the migration of floras and climaxes

IV. 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 ontogenic phases have different tolerances.
Different developmental stages of plants show different degree of tolerances, as for example seeds and mature plants are more tolerants 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.