

PHYTOGEOGRAPHY

It is also called plant geography. **Phytogeography is the science dealing with the origin, distribution and environmental relationship of plants.**

Phytogeography has two major fields of study - Static and dynamic plant geography.

Static plant geography is also called descriptive plant geography. It deals with the distribution of the floras and vegetations of different geographical regions of the world. It assembles floristic and vegetational data providing materials or problems for dynamic plant geography.

Dynamic plant geography It is also called interpretive plant geography. It is concerned with the interpretations of causes of differences and similarities between plant communities of the world. Dynamic plant geography is a borderline science i.e., it depends on more specialised sciences such as Physiology, ecology, cytology, genetics, taxonomy and phylogeny for interpreting data provided by static plant geography in order to explain and understand plant distribution over the world.

Basic principles governing geographical distribution of plants:

13 basic principles governing geographical distribution of plants were provided by **Cain (1944)** which are as follows:

A. Principles concerning the environment

1. Climate control is primary
2. Climate has varied in the past
3. The relations of land and sea have varied in the past
4. Edaphic control is secondary
5. Biotic factors are also of importance
6. The environment is holocoenotic

B. Principles concerning plant resources

7. Range of plants are limited by resources
8. Tolerance have a genetic basis
9. Different ontogenic phases have different tolerances

C. Principles concerning the migration of floras and climaxes

10. Great migrations have taken place
11. Migrations result from transport and establishment

D. Principles concerning the perpetuation and evolution of floras and climaxes

12. Perpetuation depends upon migration and evolution
13. Evolution of flora depends upon migration, evolution and environmental selection.

1. **Climate control is primary** Plant distribution is primarily controlled by the distribution of climatic conditions and in any given region, the extremes of these factors may be more significant than the means.
2. **Climate has varied in the past** There has been great variation and oscillation in climate especially at higher latitudes during the geological history Angiosperms.
3. **The relations of land and sea have varied in the past** At least some and probably considerable variation has occurred in the relative distribution and outline of land and sea during the history of Angiosperms. It is well known that there had been connection between the continental masses, oceanic basins and climates.
4. **Edaphic control is secondary** Plant distribution is secondarily controlled by the distribution of edaphic factors. The edaphic factors are related to the soil and is distinct from those of the atmospheric factors which are related to the climate. But these two factors are totally independent sets of factors.
5. **Biotic factors are also of importance** Beside climatic and edaphic factors, many ecologists and geographers employ other categories including biotic, physiographic, catastrophic and historical. Plants respond to climate in a more direct manner than the animals.
6. **The environment is holocoenotic** W.C. Allee and Park (1939) emphasised the fact that the factors of the environment act collectively and simultaneously and that the action of anyone factor is quantified by the other factors.
7. **Ranges are limited by tolerances** The functions governing the existence and successful reproduction of planted species are limited by definite ranges of intensity of particular climatic, edaphic and biotic factors.
8. **Tolerances have a genetic basis** The capacity of the species to tolerate or to respond to its environment is governed by the laws of evolution and genetics and the range of tolerance is the direct result of the genetic diversity of this species.
9. **Different ontogenic phases have different tolerances** In the life history of the organisms there are times when it is in some critical phase of its development which has a narrower tolerance range for a particular factor of the environment.
10. **Great migrations have taken place** Great movements of floras have taken place in the past and are continuing to take place.
11. **Migrations result from transport and establishment** Species movement (plant migration) is brought about by the transport of individual plants during their motile dispersal phases. After this, the next phase is the establishment of these migrules.
12. **Perpetuation depends on migration and evolution** The perpetuation of vegetation is dependant first upon the ability of these species to migrate and secondly upon the ability of these species to vary and to transmit the favourable variations to their offsprings.
13. **Evolution of floras depends upon migration, evolution and environmental selection** The evolution of flora is dependent upon plant migration, the evolution of species and the selective influences of climatic change acting upon the varying tolerances of the component of species.

AGE AND AREA HYPOTHESIS

This hypothesis was proposed by **J.C. Willis** (1922) in his book “**Age and area: a study in Geographical distribution and origin of species**” to explain the distribution of species in different geographical areas of the world.

According to the hypothesis area of distribution of a particular species is directly related to the age of these species. In other words, a species with long back history of its own evolution is presumed to occupy large areas of distribution and conversely that with recent young history of evolution is confined to smaller areas.

The hypothesis was based on his studies on the distribution of several species of *Coleus* growing on plains and hills in Sri Lanka.

Now we come to know that the area of spread of species it is not solely controlled by its age but also by several environmental and other factors.

ENDEMISM

Endemism is the ecological state of a species being unique to a defined geographical region such as an island, nation, country or zone.

In this sense it is an antonym of **exotic**.

The concept of endemism was introduced by **A. de Candolle**.

Endemism is of following types:

Polyendemism These are plants which are widely scattered exhibiting various types of discontinuous ranges.

Endemics is a term which is contrary to **Polyendemism** and it deals with those plants whose range in each case is confined to a single restricted area not extending beyond some one region, island or other circumscribed tract.

Relic endemics these are old ones whose range was once far more extensive than it is today and which are remnants or survivors of former floras.

Micro-endemics it is reserved for those organisms which are related to or evolved from other plants in the same area. They are “newborn” species relatively young taxa characteristic of newer portion of earth’s surface.

Neo-endemics When ecological conditions change, there is a tendency for such new forms to evolve bound to a particular region of special habitat conditions. Such plants are called neo-endemics.

Hawaiian islands are the most isolated islands from the mainland and where most remarkable radiations occurred, more than 90% of these species are endemic and rapid evolution has occurred among plants and animals. High level of endemism is characteristic feature of islands because they are separated from the mainland. The greater the distance from the mainland the larger the proportion of endemic species in the island.