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B.Sc HONS - Part I Paper II

Topic - AN essay on ecological succession

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Q. Write an essay on ecological succession.

Ans. According to Smith (1966) ecological succession is an orderly and progressive replacement of one community by another till the development of a stable community in that area.

Kinds of Ecological succession : Ecological succession may be of the following type :

(i) Primary succession : When succession begins on an area which has not been previously occupied by a community, it is known as primary succession.

(ii) Secondary succession : When community development is proceeding in an area from which a community was removed and where autirients and conditions for existence are already favourable, it is termed as secondary succession e.g. cut over forest.

Depending upon the predominance of green plants of heterotrophic organisms in the intial seral stages, succession is distinguish into the following types :

(i) Autrophic succession : It is wide spread in nature and begins in a predominautly inorganic environment. It is characterized by early and continued dominance by autrophic organisms.

(ii) Hetrotrophic succession : It is characterized by early dominancey by hetrotrophs such as fungi, becteria and animals.

Patterns of succession : Depending upon the types of habitat and varying amount of moisture, the successions are variously designated as follows :

(a) Xerosere : One of the best examples of xerosere is the succession which starts on bare rock, wind blown sand, rocky talus and such places where there is deficiency of water. the various stages in xerosere can be enumerated as follows :

(i) Lichen stage : Due to great exposure to sun and extreme deficiency of water, the first pioneers on the bare rock area are a few simple organisms. The most successful of such organisms are crustose lichens. During rainy season they absorb large quantities of water and flourish rapidly. Migration of spores take place by wind. The community formed by the activity of crustose lichens such as foliose lichens appear.

(ii) Moss stage : With the accumulation of dust and humus in small quantities, the environment is altered enough to allow the establishment of secondary communities in a rather definite sequence. Scattered patches of mosses such as *Tortula*, *Grimmia*, *Bryum*, *Barbula* etc. begin to invade the environment. Among the animals, mites become more varied, some small spider etc. become associated with this secondary community.

(iii) Herbaceous stage : As the mats of mosses become more extensive more soil accumulates, much of the soil is blown in from surrounding areas during windy periods. With the influx of grasses the fauna also becomes varied. Nematodes and larval insects, ants and mites appear in the gradually altered environment.

(iv) Shrub stage : Further modification of the environment provides conditions for the germination and growth of shrubs perennial woody plants such as *Acacia*, *Prosopis*, *Zizyphus* etc.

(v) Climax forest : With the establishment of shrubs more and more soil is formed and environment becomes increasingly humid. This favours the growth of woody trees. Finally a climax forest community is established and a number of terrestrial vertebrates make their appearance.

(b) Hydrosere : Hydrosere succession starts in water. A freshly built pond can be taken as a most suitable example of hydrarch succession. The various stage of hydrosere can be enumerated as follows :

(i) Submerged stage : In initial stages water is poor in nutrients and devoid of life. As water becomes rich in organic and mineral substances, certain rooted submerged hydrophytes make their appearance e.g. *Utricularia*, *Vallisneria* etc.

(ii) Floating stage : when water level in the pond remains 6 ft deep about, floating plants begin to appear e.g. *Nymphaea*, *Trautvetteria*.

(iii) Reed swamp stage : Now reed-swamp plants like *Typha*, *Rumex* and *Sagittaria* invade the area.

(iv) **marsh meadow stage** : As Succession continues, marshy meadows become too dry for swampy plants and these are replaced by herbs or shrubs.

(v) **Woodland stage** : At time certain smaller species of trees invade area taking the place of the shrubs.

Accordingly, the animal life changes as follows :

Protozoans like paramoecium, Euglena, Amoeba etc. which are the pioneers.

Later on, when the higher forms of vegetation appears, Daphnia Cyclops, Cypris etc. are replaced by other species.

At the reed swamp stage Gill breathing snails replaced by lung breathers such as Lymnaea.

Finally, at the woodland stage most of the terrestrial animals come to occupy the habitat.

(c) **Mesochore** : The successional series is much shorter because moisture condition are more ideal. In actuality, the conditions towards which hierarchy and terrestrial communities are gradually progressing are those that prevail in the mesochore series, thus giving the latter type of sequential pattern a head start.

Q. 11. What do you mean by animal behaviour ? Write an essay on Innate or Inherent behaviour.

Ans. A behaviour is a response of an organism to a stimulus. The stimuli may originate outside the organism or within the organism.

In innate behaviour, some external stimulus triggers a genetically determined response.

It includes taxis responses, reflexes and instincts.

(i) **Reflexes** : The simplest behaviour in animals are reflexes. The reflex actions are fixed, stereotyped responses to stimuli. These depend upon the reflex arc.

The constriction of the pupils of the eyes in response to intense light and the familiar kneejerk reflex are examples of reflexes in man. Reflexes operate only so long as stimuli are present, and the reflex behaviour affects only a portion of the organism.

(ii) **Taxis** : A taxis is the direct orientation of an organism in response to stimuli. A taxis whereas only a part may be involved in reflex. The orientation is said to be positive if it is in the direction of the stimulus, negative if it is away from the stimulus. For example, Euglena will move towards weak light but away from strong light. Both ants and bees utilize taxis response in returning to the hive or nest.

The orientation of the grayling butterfly is of adaptive value which always flies towards the sun in order to escape from predators. The butterfly orients