

1. How is diapause different from hibernation?

Ans. Diapause is a period of suspended growth occurring in many insects and other invertebrates during which metabolic activities are greatly reduced. On the other hand, hibernation is a sleep like state in which a few animals, such as fishes and amphibian, pass the winter season as a way of surviving food scarcity and cold weather.

2. If a marine fish is placed in a fresh water aquarium, will the fish be able to survive? Why or why not?

Ans. When a marine fish is placed in a fresh water aquarium, the concentration of water, the difference between the concentration of the water and inside of the fish are increased and therefore, the osmotic pressure is also increased. The fish has to take more water into the body to be able to survive and to get rid of the excess salt present in its body.

3. Define phenotypic adaptation. Give one example.

Ans. Phenotypic adaptations are non-genetic changes occurring in living organisms due to various extreme environmental condition, such as stress, extreme temperature, change of habitat. These includes acclimatisation, behavioral changes, etc.

4. Most living organisms cannot survive at temperature above 45°C. How are some microbes able to live in habitats with temperatures exceeding 100°C?

Ans. Such microorganisms have minimum amount of free water in their bodies. Removal of water provides resistance to high temperature.

5. List the attributes that populations but not individuals possess.

Ans. (a) Natality (b) Mortality
(c) Growth forms (d) Population density
(e) Population dispersion (f) Population age distribution

6. If a population growing exponentially double in size in 3 years, what is the intrinsic rate of increase(r) of the population?

Ans. If the population growing exponentially double in size in 3 years, the intrinsic rate of increase of this population will be towards maximum.

7. Name important defence mechanisms in plants against herbivory.

Ans. There are various defence measures for animals against predators. But plants, as they cannot away, have certain defence mechanisms against herbivory. Their main defences are chemical toxins, such as strychnine, a poison produced by tropical vine, morphine by opium poppy, nicotine produced by tobacco plant. Apart from these chemicals. The common defence measure is presence of spines on the leaves, stems of the plant, modifications of leaves

into thorns, development of sharp silicated edges in leaves which prevent them against damage caused by herbivores.

8. An orchid plant is growing on the branch of mango tree. How do you describe this interaction between the orchid and the mango tree?

Ans. An orchid plant is growing on the branch of a mango tree is called epiphyte (i.e. plants growing on other plants or trees). This type of interaction is known as commensalism.

Commensalism can be defined as an interaction between two animal or plant species that habitually live together in which one species benefits from the association while the other is not significantly affected.

In the above case, the orchid growing on the branch of mango tree get more light to grow and also, the mango is not named in any way.

9. What is the ecological principle behind the biological control method of managing with pest insects?

Ans. The ecological principle behind the biological control method of managing with pest insects is predator, prey relationship. It is based on the ability of the predator to regulate prey population.

10. Distinguish between the following:

(a) Hibernation and Aestivation (b) Ectotherms and Endotherms

Ans. (a)

<i>Hibernation</i>	<i>Aestivation</i>
is a sleep-like state in which some animals pass the winter months as a way of surviving food scarcity and cold weather.	is a state of inactivity occurring in some animals, such as lungfish, during prolonged periods of drought or heat.
Animals that hibernate include bats, hedgehogs, many fishes and amphibians, and reptiles.	Various bodily activities, such as feeding, respiration, movement, are slowed down considerably.

(b)

<i>Ectotherms</i>	<i>Endotherms</i>
are animals which their body temperature by absorbing heat from the surrounding environment. These are also called poikilotherms.	are animals which can generate and maintain heat within its body independently of the environmental temperature.

All animals except mammals and birds are ectotherms, and are often described as being cold-blooded animals.

Mammals and birds are endotherms and are often described as homoiotherms or warm-blooded animals.

11. Write a short note on

- (a) Adaptations of desert plants and animals
- (b) Adaptations of plants to water scarcity
- (c) Behavioural adaptations in animals
- (d) Importance of light to plants
- (e) Effect of temperature or water scarcity and the adaptations of animals.

Ans.

- (a) Desert plants have very small leaves or no leaves at all, and carrying on photosynthesis through the stems. Their stem could become succulent, and can store and retain water. Animals living in hot climatic region tend to be smaller than those living in cold climates. This can be explained by the fact that the amount of heat gained from the environment is approximately proportional to the body surface area. The majority of animals living in desert are small, like kangaroo rat. It feed on dry seeds and other dry plant material and does not drink. Kangaroo rat excessive evaporation (water loss) in the wild by spending much of its time in underground burrows having humid atmosphere.

- (b) The evergreen trees such as rhododendron, show water scarcity by an inward curling of the leaves. A more significant response is the closure of stomata, which reduces transpiration, but raises the internal temperature of the leaf affecting the rate of synthesis of proteins and photosynthesis.

Deciduous trees of the temperature region drop their leaves in autumn, avoiding winter drought. Some water stressed plant's accumulate excessive amounts of inorganic ions.

- (c) Migrating temporarily to a less stressfull habitat forms a more stressfull habitat is a kind of behavioral adaptation in animals which enables them to survive in better environmental conditions. Desert lizards regulate their body temperature constant by behavioural means. They bask in the sun and absorb heat when their body temperature decreases below the optimum, but move into shady or underground places when the temperature of the surrounding area starts increasing.

- (d) The intensity of light impinging on the alltrophic layer controls the entire ecosystem, through its influence on primary production. The relationship of intensity to photosynthesis, in both terrestrial and aquatic plants. Light is required for the production of chlorophyll in chloroplasts. Plants germinated under insufficient illumination causes the destruction of chlorophyll.

Besides photosynthesis, green plants are influenced by light in their growth, reproduction, development, movement and other activities.

- (e) Animals mainly are of two types as they are adapted to controlling their body temperature. Poikilotherms are the animals whose temperature fluctuates with that of the environment (e.g. invertebrates and vertebrates), other than birds and mammals. In contrast, homeotherms are the animals which can maintain their body temperature at a constant level (e.g. birds and mammals).

12. List the various abiotic environmental factors.

Ans. The various abiotic environmental factors can be divided into three distinguishable, yet inter-related sub-divisions.

- (i) **Lithosphere:** It comprises the solid components of the abiotic environment, including soil.
- (ii) **Hydrosphere:** It includes all water bodies such as rivers, streams, ponds, lakes and oceans.
- (iii) **Atmosphere:** It constitutes all the layers of gases surrounding the earth.

13. Give an example for:

- (a) An endothermic animal (b) An ectothermic animal
(c) An organism of benthic zone

Ans. (a) Man, *Homo sapiens* (b) Black bear, *Ursus americanus*
(c) Red algae

14. Define population and community.

Ans. Population can be defined as the total number of individuals of a species or any other class of an organism in a defined area or habitat or a group of individuals of the same species within a community.

Community can be defined as a naturally occurring assemblage of species living within a defined area or habitat.

15. Define the following terms and give one example for each:

- (a) Commensalism (b) Parasitism

- (c) Camouflage (d) Mutualism
(e) Interspecific competition (f) Symbiosis
(g) Mimicry

Ans.

- (a) Commensalism is the association between organisms of different species in which one species benefits but does no apparent harm to the other. For examples, in the large intestine of human being, bacteria *Escherichia coli* are present which helps in digestion.
- (b) Parasitism is an association in which one organism lives on or in the body of another, from which it obtains its food. For example, the parasites of humans include fleas and lice, various bacteria, protozoans and fungi.
- (c) Camouflage is a high degree of similarity between an animal and its visual environment, which enables it to be disguised or concealed. For example, birds with necks and heads of contrasting colours are not easily recognised by their enemies under certain condition.
- (d) Mutualism is an association between two organisms of different species in which each partner benefits. For example, the cross-fertilisation or pollination of plant flowers by insects (sometimes by birds) is a mutual relation of wide occurrence and great importance, because many plants are self-sterile.
- (e) Inter-specific competition can be defined as an interaction occurs between different species that share some environmental resource when this is in short supply. Interspecific competition often results in the dominance of one species over another. For example, when two species of *Paramecium*, *Paramecium caudatum* and *P. aurelia* are confined in a closed containers with fixed amount of food, out of them one species always died out.
- (f) The term symbiosis means living together. Now a days, this term is used for all interactions in which two species actually live together without regard to benefit or harm to the participants. It, thus, includes commensalism, proto-cooperation, mutualism, amensalism, parasitism. Example *Rhizobium* bacteria and roots of leguminous plants.
- (g) It is a defensive mechanism adopted by palatable organisms to protect themselves from predators. It may be defined as the superficial but close resemblance of one organism to another or to the natural objects among which it lives, that secures its concealment, protection or some other advantage. Example, Viceroy butterfly.

16. With the help of suitable diagram describe the logistic population growth curve.

Ans. The S-shaped growth curve is also called a logistic growth curve. It describes a situation in which (in a new environmental conditions) the population density of a organism increases slowly establishes itself then increasing rapidly, approaching an exponential growth rate. Many population of microorganisms broadly follow this basic sigmoidal pattern. For example, when a fresh culture medium is inoculated with bacteria, sigmoidal or S-shaped growth curve is observed.

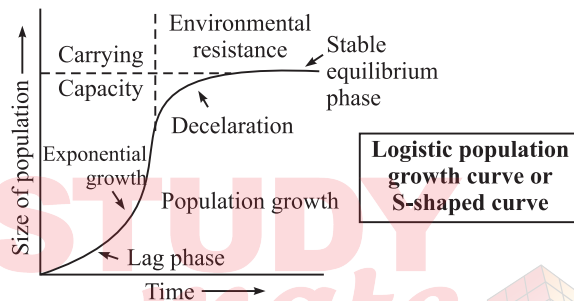


Fig. 6.6

17. Select the statement which explains best parasitism.

- One organism is benefited.
- Both the organisms are benefited.
- One organism is benefited, other is not affected.
- One organism is benefited, other is affected.

Ans. (d) One organism is benefited, other is affected.

18. List any three important characteristics of a population and explain.

Ans. The three important characteristics of a population are:

- Density:** The number of individuals per unit area or volume. For example, the number of frogs per m^3 of forest region.
- Natality or Birth rate:** The birth rate is determined by the number of individuals born to a given population during a given period of time.
- Mortality or Death rate:** The death rate or mortality represents a decrease in a given population during a given period of time. Generally, the death of individuals in a population are expressed by specific mortality which is described as the mortality for given age group.