WHEATHER, CLIMATE & ADAPTATIONS

WEATHER

- The day-to.day condition of the atmosphere at a place with respect to the temperature, humidity, rainfall, wind-speed, etc., is called the weather at that place.
- The weather is generally not the same on any two days and week after week.
- The maximum temperature ofthe day occurs generally In the afternoon while the minimum temperature occurs in the early morning.
- All changes in the weather are caused by the sun. The sun is a huge sphere of hot gases at a very high temperature. The distance of the sun from us is very large. Even then the energy sent out by the sun is so huge that it is the source of all heat and light on the earth. So, the sun is the primary source of energy that causes changes in the weather.

CLIMATE

- The average weather pattem taken over a long time, is called the climate of the place. The tropical and the polar regions are the two regions of the earth, which have severe climatic conditions.
- Climate is the average weather of an area.
- Temperature and rainfall are twomost important factors which effect the climate of an area.
- Microclimate represents the climatic conditions which are present at local scale.
- Macroclimate represents the climatic conditions which are present at large scale. Forest is an example of macroclimate.
- The Ecological niche of an organism represents the range of conditions that it can tolerate, the resources it utilises, and its functional role in the ecological system.
- Each speCies has a distinct niche, and no two species are believed to occupy exactly the same, niche.

ADAPTATION

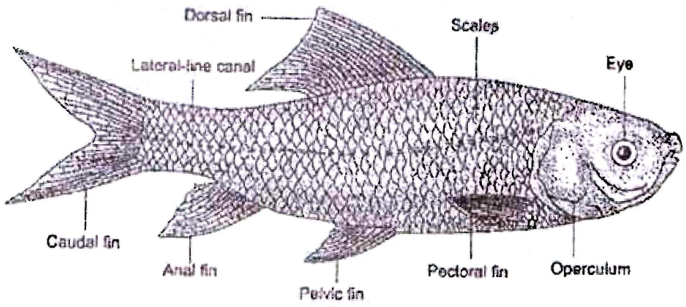
- Animals are adapted to the conditions in which they

  Animals are adapted to survive in the conditions in which they live. Animals living in very cold and hot climate must possess special features to protect themselves against the extreme cold or heat. Features and habits that help animals to adapt to their surroundings are a result of the process of evolution.
- Adaptations may be defined as the characteristics or living forms to develop, over a period of time certain morphological, anatomical, physiological, and ecological features which enable them to survive and reproduce within the limits of a particular environment.
  E.g. fish, whales, aquatic plants are adapted to live in water, birds and bats in air and cacti, insects, camels in deserts .

(a) Aquatic adaptations:

(i) In Animals: Animals that live in water are called aquatic animals.

- They have a streamlined body that makes it easier for them to move in water. They have gills for breathing in water. Fins and the tail help them to swim. The scales on their body provide protection. Bony fishes have air spaces in their bodies to help them float. Common aquatic animals are fishes, whales, crabs, octopus, etc.



(ii) In plants : Aquatic habitat can be present as marine (oceanic) and fresh water (ponds & lakes) habitat.

Aquatic plants can be present as floating or submerged or amphibious plant. Usually they have narrow and thin ribbon shape leaves and less developed roots. Plant body is also covered by mucus layer to reduce friction & having inactive stomata (in submerged plants) and active stomata at upper surface only (in floating plants).

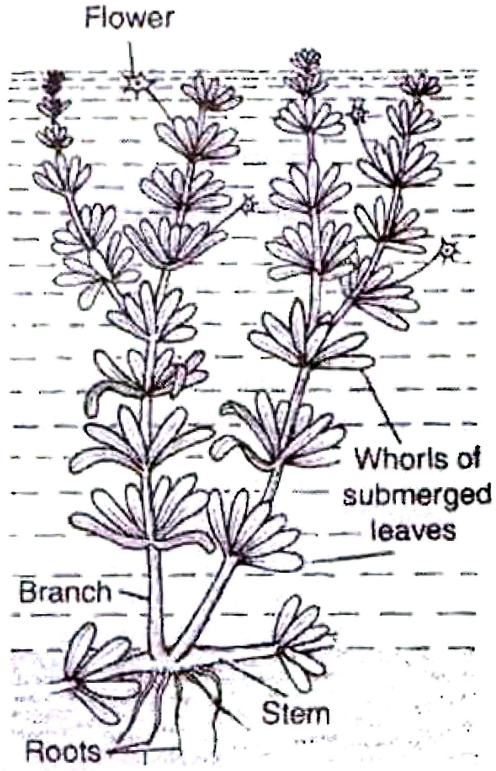
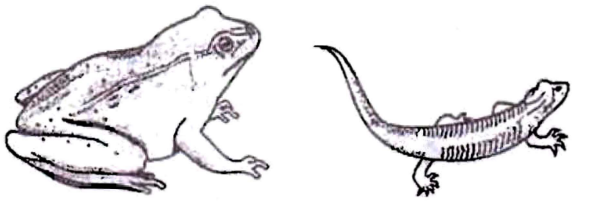


Fig. Hydrilla

(b) Amphibious adaptations

(i) In Animals: Animals which live both on land and water are called amphibious animals.

- These animals have moist and slimy skin, which helps in breathing. They can also breathe through their lungs.
- The feet of these animals serve as paddles for swimming .
- They are cold blooded animals. Frogs, toads and salamanders are examples of amphibians. These organism show hibernation i.e. deep long winter sleep to escape from harsh cold condition.

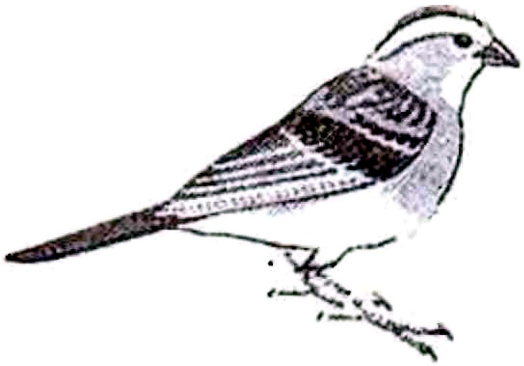


(a) Frog (b) Salmander

(ii) In Plants : In amphibian plants root system is more develop than other hydrophytes. They are heterophyllous in nature, e.g. Ceretophylium.

(c) Aerial adaptations :

- These animals are adapted for the aerial mode of life. They have a streamlined body covered with featers.
- Forelimbs are modified into wings.
- The bones are light, hollow, spongy and contain may air cavities.
- They have lungs for breathing. Nervous system and sense organs are well developed. Examples : bat, eagle, sparrow, penguin.



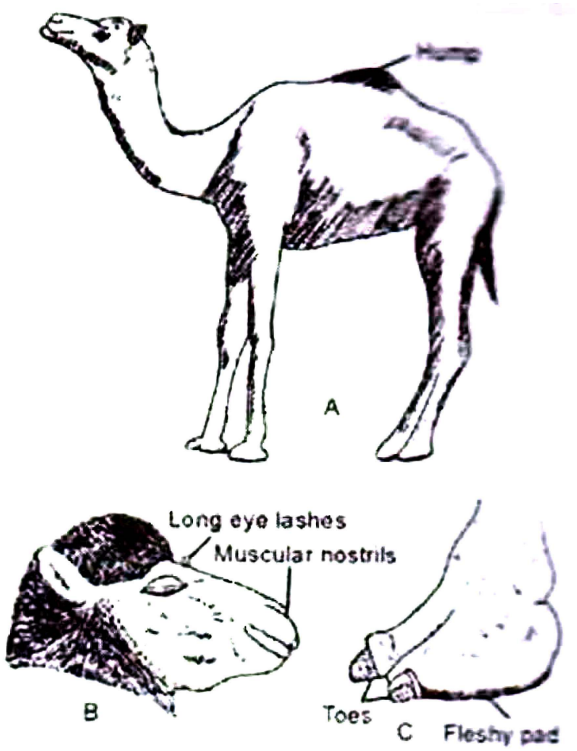
(d) Terrestrial adaptations

- Plants and animals that live on land are called terrestrial plants and terrestrial animals respectively.
- Terrestrial plants are usually divided into root, stem and leaves and well adapted for water absorption & photosynthesis.
- While terrestrial animals have lungs for breathing. The body is covered with scales or hairs. They have a well Opuntia developed nervous system with sense organs for responding to the various environmental changes. Examples of terrestrial animals are dog, cat, horse, deer etc.

(A) Desert Adaptation or Xeric Adaptation: Desert is a water deeplete area so basically plants and animals are adapted for little loss of water.

(I) **In Animals :** Camels are desert animals which are well adjusted to the dry hot climate. They store water in all the cells of their body.

- Their urine is very concenttrated. Their nostrils have long hairs to prevent the entry of sand and dust. They have no sweat glands in their skin.

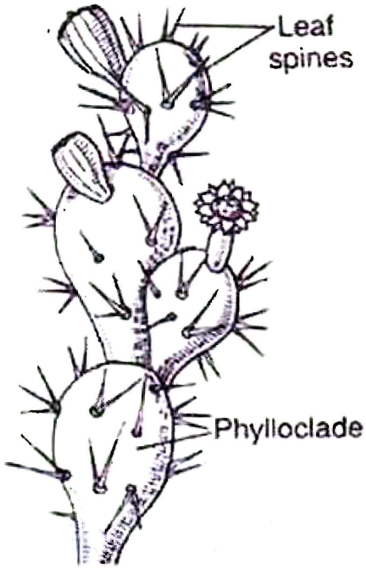


A. The Indian or Arabian camel *(Camelus dromedarius)*

B. Head **C.** Foot showing adaptations to hc. (Camelus dromedarius)

(ii) **In Plants :** Desert plants are known as **xerophtic plants.** They lose very little water through transpiration. The leaves in desert plants are either absent, very small or they are present in the shape of spines. This helps in reducing loss of the water from the leaves through transpiration.

- Stem of modified for retaining of water and for photosynthasis. Roots are deeper to absorb water.



Opuntia

(B) Polar regions adaptation :

- Polar regions are charaterized by heavy and snowy winters.

(i) In Animals : The animals seen here are while or light in colour. This enables them to match. the colour of the background (camouflage); and also to regulate the temperature of the body (thermal regulation).

- The animals can store fat in their body in summers so that it can be consumed in winter months. During winter months, animals also hibernate. This reduces their metabolic activities to the minimum.

Penguins huddled together

- While animals living in mountain regions having thick skin or fur to protect them for cold E.g. Yak.

(ii) I n Plants: Usually plants are absent in polar area but some lichens & mosses are found there.

- While mountain areas are cold and windy area. In some areas snowfall may take place in winter.
- At mountain regi on norma lly cone shaped trees are present that have sloping branches. The leaves of some of these trees are needle like. This helps the rain water and snow to slide off easily.

(C) Tropical rainforest's adaptation:

(i) **In Animals:** Animals in the tropical rainforests are adapted such that they eat different kinds of food to overcome the competition for food and shelter.

- Some adaptations of animals living in the tropical rainforests Include living on the trees, development of strong tails, long and large beaks, bright colours, sharp pattems, loud voice, diet of fruits, sensitive hearing, sharp eyesight, thick skin, ability to camouflage in order to protect themselves from predators, etc.

Red-eyed frog

Elephant

(ii) **In Plants:** In tropical rain forest diverse flora is found which is present as evergreen forest.

ENVIRONMENT

It Is the sum total of all bi otic and abiotic components, substances and conditions that surround & influence the organisms. The various components of environment are interlinked as well as interdependent.

- The place where an orga nism is found is called habitat. Organisms are influenced by specific habitat.

COMPONENTS OF ENVIRONMENT

It consists of 2 major components :

(a) Non living Components: Also called as abiotic components.

(i) Climate: It is the average weather of an area including general patterns of atmosphere and seasonal variations.

(ii) Light

(iii) Temperature

(iv) Water

(v) Soil

(b) Biotic or Living Components :

The living components consist of 3 types of organisms

(i) Producers: Organisms which can prepare their own food from simple inorganic substances like CO2 and Hp in presence of sunlight. e.g. Green plants, photosynthetic algae, photosynthetic bacteria etc.

(ii) Consumers: Those organisms which consume food prepared by producers are called as consumers. They can be :

- **Herbivores :** Which eat only plants and their products. Also called as primary consumers.
- **Carnivores:** Which eat only other animals also called as secondary consumers.
- **Omnivores:** Which eat both producer (plants) & consumers (animals).

(iii) Decomposers: The microorganisms which break down the complex organic compounds present in dead orga nisms (plants and animals) e.g. fungi, bacteria etc.

- Characteristics of living beings. All the living beings can do respiration. They need food to do their life process, e.g. Plants can synthesize their food by photosynthesis while animals are directly or indirectly depend on plants for nutrition.
- They can do growth .
- They can respond to stimuli (any change in environment which affect them.)
- They can do excretion.
- They can do reproduction.
- They can do movement.

SOME IMPORTANT TERMINOLOGIES

- **Adaptation:** Adjustment or preparation of natural or human systems to a new or changing environment which moderates harm or exploits beneficial opportunities.
- **Atmosphere :** The gaseous envelope surrounding the Earth.
- **Climate :** Climate in a narrow sense is usually defined as the "average weather,".
- **Climate Changes :** Climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.
- **Ecosystem :** Any natural unit or entity including living and non-living parts that interact to produce a stable system through cyclic exchange of materials.
- **Eutrofication :** Growth of excess algae on water body surface because of water pollution by fertilizers.