

Organisms and Populations-2

Prepared by Mr. B. John Ebenezer

Class: XII

Biology

Very Short Answer Type Questions

1. How are the species that can tolerate a narrow range of temperature called?

Species that can tolerate a narrow range of temperature are called Stenothermal species.

2. What are Eurythmic species?

Eurythmic species are those organisms that can adapt to a wide range of temperature changes.

3. How are the species that can tolerate a wide range of salinity called?

Species that can tolerate a wide range of salinity are called Euryhaline.

4. Define stenohaline species.

Stenohaline are those species which cannot tolerate fluctuations in the degree of salt in the water.

5. What is the interaction between two species called?

If the interaction is between the same species, it is called intraspecific interaction.

6. What is commensalism?

Commensalism is the type of interaction between two species in which one species gets benefited by the other and the other species neither get benefitted nor affected.

7. Name the association in which one species produces a poisonous substance or a change in environmental conditions that is harmful to another species.

The association in which one species produces a poisonous substance or a change in environmental conditions that is harmful to another species is Amensalism.

In amensalism one species is harmed and the other species is neither benefited nor harmed.

E.g. When cattle trample on grass, the grass is crushed. The cattle is neither benefited from this nor harmed.

8. What is Mycorrhiza?

The association between roots of higher plants and fungi is known as mycorrhiza.

The fungi help the plant in the absorption of essential nutrients from the soil. Plant in turn provides the fungi with energy-yielding carbohydrates.

9. What are the emergent land plants that can tolerate the salinities of the sea called.

Emergent land plants that can tolerate the salinities of the sea are called Mangrove plants.

10. Why do high-altitude areas have brighter sunlight and lower temperature as compared to the plains?

High altitude areas have a very low concentration of dust particles and atmospheric gases which absorb the sunlight. So, they have brighter sunlight

High altitude areas have a low atmospheric pressure. Lower atmospheric pressure results in lower temperature at high altitudes.

11. What is homeostasis?

Homeostasis is the ability of the organism to maintain a constant internal environment despite varying external environmental conditions like temperature.

12. Define aestivation.

Aestivation is the summer sleep to avoid extreme heat and desiccation during the summer season. The organisms remain dormant or inactive during summer.

Fish and snails are examples of organisms aestivating during summers.

13. What are diapause and its significance?

Diapause is a stage of suspended development in some organisms like zooplankton in lakes and ponds. It helps to avoid unfavourable conditions.

14. What would be the growth rate pattern, when the resources are unlimited?

When the resources are unlimited, the growth rate pattern would be exponential.

15. What are the organisms that feed on plant sap and other plant parts called?

The organisms that feed on plant sap and other plant parts are called Phytophagous.

Eg. Insects and other invertebrates.

16. What is high altitude sickness? Write its symptoms.

High altitude sickness is also known as mountain sickness. Symptoms are breathlessness, fast breathing, nausea, vomiting, headache etc.

17. Give a suitable example for commensalism.

It is an interaction between two organisms in which **one species benefited** and the other is **neither benefited nor harmed**.

The interaction between cattle egret and grazing cattle is an example of commensalism.

18. Define ectoparasite and endoparasite and give suitable examples.

The parasites which live on the external body surface of the host organism and get nutrition from them are called ectoparasites. Example. Lice on humans, ticks on dogs, etc.

The parasites which live inside the body of the host organism and get nutrition from them are called endoparasites. Example. Human liver fluke, tapeworm, etc.

19. What is brood parasitism? Explain with the help of an example.

Brood parasitism is a type of parasitism in which an organism lays eggs in the nest of another organism.

Example. Cuckoo lays eggs in the nest of its host, and the hosts incubate the eggs.

During the course of evolution, the **eggs of the parasitic bird have evolved to resemble the host egg in size and colour** to reduce the chances of the host bird detecting the foreign eggs and ejecting them from the nest.

Short Answer Type Questions

1. Why are coral reefs not found in the regions from West Bengal to Andhra Pradesh but are found in Tamil Nadu and on the east coast of India?

High salinity, optimal temperature and less siltation are essential for the colonization of corals.

If siltation and freshwater inflow are very high, the corals do not colonise. When the siltation and freshwater inflow by the rivers are very less, the corals colonise.

All these conditions are found in Tamil Nadu and on the East Coast of India but are not found in the regions from West Bengal to Andhra Pradesh.

2. If a freshwater fish is placed in aquarium containing seawater, will the fish be able to survive? Explain, giving reasons.

If a **fresh water fish** is placed in an aquarium containing **sea water**, it will not be able to survive.

Sea water is hypertonic as compared to fresh water fish, so the fish will lose water due to exosmosis and die because of dehydration.

3. Why do all freshwater organisms have contractile vacuoles, whereas the majority of marine organisms lack them?

Fresh water is a hypotonic solution compared to the body of fresh water organisms which is hypertonic. Hence there is a continuous inflow of water due to endosmosis. Therefore fresh water organisms need contractile vacuoles to excrete out excess water.

Marine water is a hypertonic solution compared to the body of marine organisms which is hypotonic. Hence there is a continuous outflow of water due to exosmosis. Thus, they do not need contractile vacuoles to remove excess water.

4. Define heliophytes and sciophytes. Name a plant from your locality that is either heliophyte or sciophyte.

The plants which require high intensity of light for their optimum growth are called heliophytes. They form the roof of the forest. Eg. Banana, sunflower, mango.

The plants which require low intensity of light for their optimum growth are called sciophytes. They form the understory of the forest. Eg. Lycopodium.

5. Why do submerged plants receive weaker illumination than exposed floating plants in a lake?

The sunlight reaches the plant by passing through deep water. Floating plants are exposed to high-intensity sunlight because they float on the surface of the water. Sunlight directly reaches the plant.

6. In an association of two animal species, one is a termite which feeds on wood and the other is a protozoan Trichonympha present in the gut of the termite. What type of association do they establish?

The association in which one is termite and the other is Trichonympha is a type of mutualism relation that is both the interacting species are benefitted.

7. Lianas are vascular plants rooted in the ground and maintain the erectness of their stem by making use of other trees for support. They do not maintain a direct relationship with those trees. Discuss the type of association the lianas have with the trees.

The type of association the lianas have with the trees is commensalism because the plant gets the support of the tree without harming or providing any benefit to the tree.

8. Give the scientific names of any two microorganisms inhabiting the human intestine.

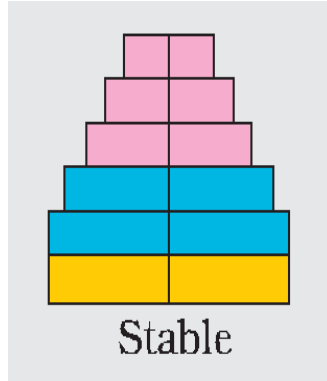
The scientific names of two microorganisms inhabiting the human intestine are Escherichia coli and Lactobacillus.

9. What is a tree line?

Tree line is an altitude beyond which trees do not grow. It is also known as timber line.

10. Define 'zero population growth rate'. Draw an age pyramid for the same.

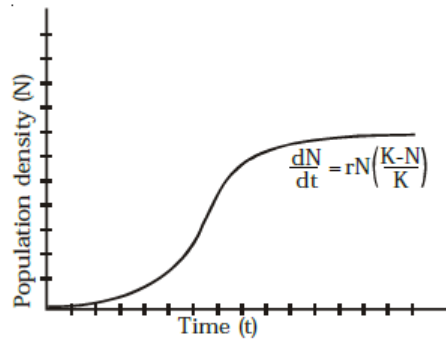
Zero Population growth rate is a condition wherein the population neither grows nor declines.



11. List any four characters that are employed in the human population census.

- Natality and mortality
- Sex ratio
- Population density
- Age distribution

12. Comment on the growth curve given below.



The above graph shows a population growing in a habitat having limited resources.

The graph shows an initial lag phase.

After that, an increase in population takes place, known as acceleration, following which deceleration takes place and at last, asymptote occurs.

A sigmoid curve plot is formed when the population reaches carrying capacity.

This is called Verhulst-Pearl logistic growth. This is represented by an equation:

$$\frac{dN}{dt} = rN \frac{\{K-N\}}{K}$$

Where **N = Population density at time t**
r = Intrinsic rate of natural increase
K = Carrying capacity

The logistic population growth curve is commonly observed in the natural conditions when there is limited supply of food.

(a) Lag phase:

During the lag phase, the cells are metabolically active but they do not divide. The cells increase in size and adapt to the new environment.

(b) Exponential phase:

During this phase, the number of cells increase suddenly due to rapid growth.

The population grows exponentially due to the availability of sufficient food resources, constant environment, and the absence of any interspecific competition.

As a result, the curve rises steeply upwards.

(c) Stationary phase:

During this phase, the population becomes stable.

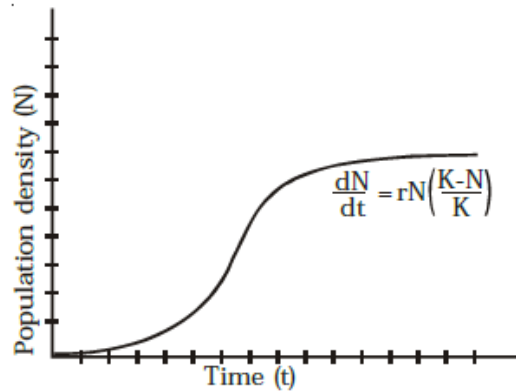
The number of cells produced in a population equals the number of cells that die.

The population of the species would reach nature's carrying capacity in its habitat.

13. A population of *Paramecium caudatum* was grown in a culture medium. After 5 days the culture medium became overcrowded with *Paramecium* and had depleted nutrients. What will happen to the population and what type of growth curve will the population attain? Draw the growth curve.

Sigmoid type of growth curve would be obtained. It shows a population growing in a habitat having limited resources.

The graph obtained is shown below:



The graph initially shows the lag phase.

Due to acceleration, a sudden increase has taken place.

After that it is followed by deceleration as the available nutrients got depleted because of excessive usage and growth of paramoecium stops. At last, asymptote occurs.

14. In an aquarium, two herbivorous species of fish are living together and feeding on phytoplankton. As per the Gause's Principle, one of the species is to be eliminated in due course of time, but both are surviving well in the aquarium. Give possible reasons.

According to Gause's principle, one of the species is to be eliminated, i.e., no two species can live in the same niche and hence one of them need to be eliminated.

But in the given scenario, two herbivorous species are living in the same niche and feeding on phytoplankton may be due to sufficient availability of phytoplanktons.

15. While living in and on the host species, the animal parasite has evolved certain adaptations. Describe these adaptations with examples.

The loss of unnecessary sense organs.

Presence of adhesive organs or suckers to cling on to the host in tapeworms and leeches.

Loss of digestive system i.e., tapeworm.

High reproductive capacity i.e., roundworm produces large progeny.

16. Do you agree that regional and local variations exist within each biome? Substantiate your answer with a suitable example.

Yes, regional and local variations exist within each biome.

A biome is a large community in the world.

The main biome of the world does not show the boundary of any country.

Regional and local variations lead to the formation of a wide variety of habitats.

On earth, life exists even in extreme and harsh habitats – scorching Rajasthan desert, perpetually rain-soaked Meghalaya forest, deep ocean trenches, torrential streams, permafrost Polar Regions, high mountain tops, boiling thermal springs and stinking compost pits, etc.

17. Which element is responsible for causing soil salinity? At what concentration does the soil become saline?

The elements responsible for causing soil salinity are Na^+ , K^+ , Ca^{2+} , Mg^{2+} and Cl^- .

Soil salinity is the salt content in the soil, which is caused by improper irrigation.

Causes of Soil Salinity are improper irrigation and human activities like fertilizing crops.

18. Does the light factor affect the distribution of organisms? Write a brief note giving suitable examples of either plants or animals.

Yes, the light factor affects the distribution of organisms.

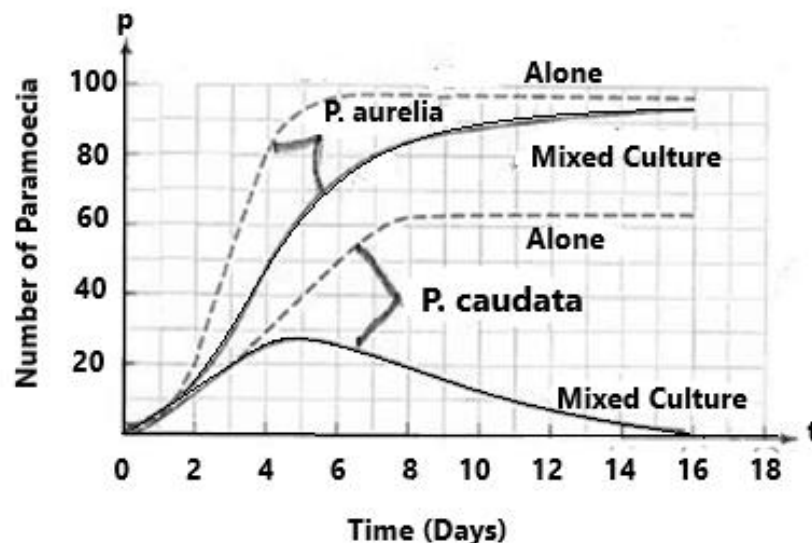
Sunlight is an important factor for plants for their photosynthesis.

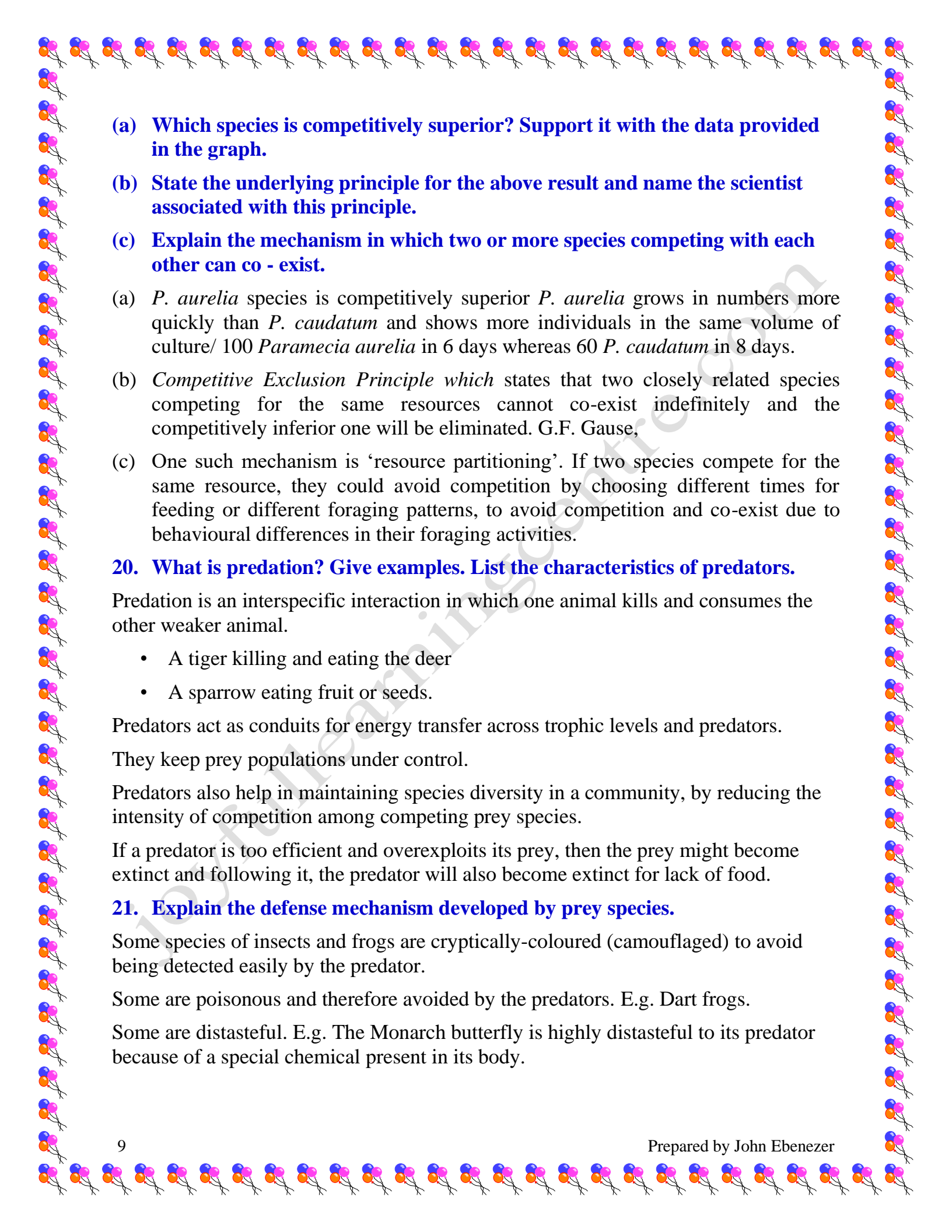
For example, many species of small plants (herbs and shrubs) growing in forests are adapted to photosynthesize optimally under very low light conditions.

So, they will be seen distributed in shady areas under tall, canopied trees.

The small plants in the forests are usually overshadowed by tall, canopied trees.

19. Observe the graph given below. The graph represents inter-specific interaction between two species of Paramecia competing for the same resource in a culture medium. *Paramecium caudatum* and *Paramecium aurelia* were grown alone (separate cultures) as well as in mixed cultures. It was found that each species grew in numbers according to the logistic equation.



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- (a) Which species is competitively superior? Support it with the data provided in the graph.
- (b) State the underlying principle for the above result and name the scientist associated with this principle.
- (c) Explain the mechanism in which two or more species competing with each other can co - exist.

- (a) *P. aurelia* species is competitively superior *P. aurelia* grows in numbers more quickly than *P. caudatum* and shows more individuals in the same volume of culture/ 100 *Paramecia aurelia* in 6 days whereas 60 *P. caudatum* in 8 days.
- (b) *Competitive Exclusion Principle* which states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated. G.F. Gause,
- (c) One such mechanism is ‘resource partitioning’. If two species compete for the same resource, they could avoid competition by choosing different times for feeding or different foraging patterns, to avoid competition and co-exist due to behavioural differences in their foraging activities.

20. What is predation? Give examples. List the characteristics of predators.

Predation is an interspecific interaction in which one animal kills and consumes the other weaker animal.

- A tiger killing and eating the deer
- A sparrow eating fruit or seeds.

Predators act as conduits for energy transfer across trophic levels and predators.

They keep prey populations under control.

Predators also help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species.

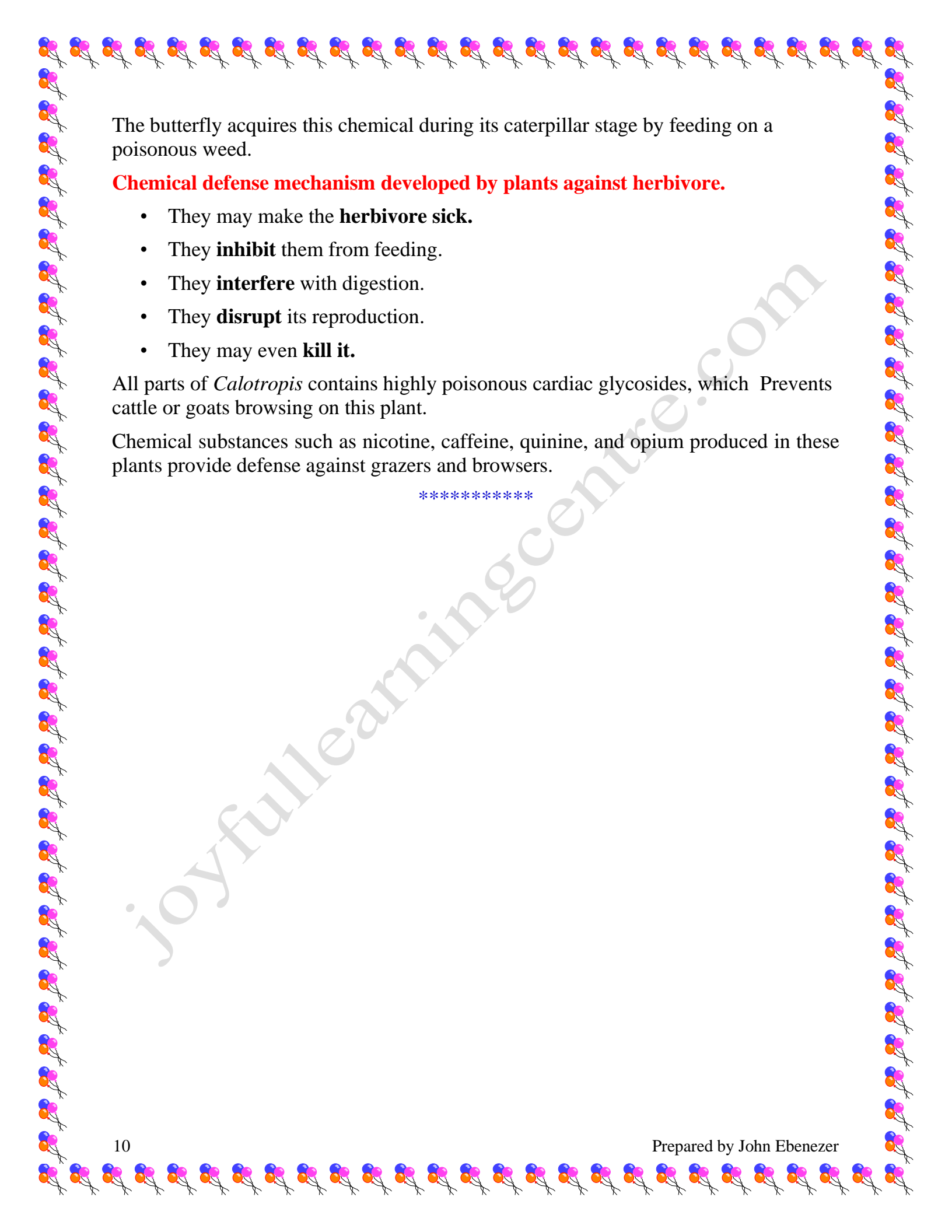
If a predator is too efficient and overexploits its prey, then the prey might become extinct and following it, the predator will also become extinct for lack of food.

21. Explain the defense mechanism developed by prey species.

Some species of insects and frogs are cryptically-coloured (camouflaged) to avoid being detected easily by the predator.

Some are poisonous and therefore avoided by the predators. E.g. Dart frogs.

Some are distasteful. E.g. The Monarch butterfly is highly distasteful to its predator because of a special chemical present in its body.



The butterfly acquires this chemical during its caterpillar stage by feeding on a poisonous weed.

Chemical defense mechanism developed by plants against herbivore.

- They may make the **herbivore sick**.
- They **inhibit** them from feeding.
- They **interfere** with digestion.
- They **disrupt** its reproduction.
- They may even **kill it**.

All parts of *Calotropis* contains highly poisonous cardiac glycosides, which Prevents cattle or goats browsing on this plant.

Chemical substances such as nicotine, caffeine, quinine, and opium produced in these plants provide defense against grazers and browsers.
