Colouration and Mimicry

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Colouration

- Colouration is an adaptation where the animals develop different colors and color patterns for protection, warning, frightening the enemies, capturing prey, recognizing mates so on.

- **Types:**

1. Protective coloration:

- The animals develop color patterns to conceal themselves from the predators. It is also called as **concealing coloration** or **cryptic coloration**.
- **Eg. 1. Countershading in sharks and Dolphins**

Sharks and Dolphins use countershading to blend in with their environment. By being darker colored on the top and lighter underneath. They help to themselves conceal from their preadators and prey.
From above, looking down to the ocean floor it appears darker and from below looking up to the surface it appears lighter color.

- **Eg 2. A number of stick caterpillars**, the larvae of moths, resemble twigs in their color, shape and posture.
- Their color remarkably resembles their background.

2. Aggressive coloration:

- The animals develop color pattern to threaten or frighten other animals.
- Eg. Eyed hawk moth uses the eye spots to threaten the predators.

3. Warning coloration:

Animals with effective chemical defenses often exhibit bright **aposematic coloration .**

Eg . Poison Dart frog

Aposematic coloration seems to be adaptive because predators often avoid prey that have bright color patterns.

Mimicry

- Term introduced by **Bates**.
- The resemblance of one organism to another or to any natural object for the purpose of concealment, protection or for some other advantage.
- The organism which exhibits mimicry is called **mimic**.
- The organism which is mimicked or imitated is called a **model.**

CONDITIONS

- The mimics and models should occur in the same area.
- Mimics should be lesser in number than the models.
- The models should be unpalatable or harmful
- The imitation should be clear and visible.

There are 3 types in mimicry

1. Protective mimicry:

When mimicry offers protection of the mimic, the mimicry is called protective mimicry.

Eg . 1. The leaf insect **Phyllium** lives among green leaves on trees.

- Its wings and legs are green like the color of leaves.
- Its legs are flattened and the wings have a venation similar to leaves.
- Thus, the insect cannot be distinguished from the leaves and it helps the insect to escape from predators.

- **Eg 2. Stick insect**
- Also called as walking stick mimics exactly the twigs.
- Stick insects have long, cylindrical bodies, that are stick-like in both shape and colour.
- Their natural camouflage makes them difficult for predators to detect.

2. Warning mimicry

- There are some harmless or palatable animals which mimic the harmful or non-palatable animals. By this mimics warn the enemies and protect themselves.

- **Eg .** The non-poisonous snake Lycodon mimics the poisonous krait in its color pattern.

Batesian Mimicry

- It is form of protective mimicry in which a species that is edible or harmless closely resembles an inedible or harmful species and therefore is avoided by predators.
- Example- Monarch butterfly and Viceroy butterfly. The Monarch butterfly is inedible and viceroy butterfly is edible.

Viceroy Butterfly (mimic)

Monarch Butterfly

3. Aggressive mimicry

- In this mimicry, the mimics possess some lure to attract the prey.
- Eg. In **angler fish Lophius**, the first fin ray of the dorsal fin is produced into a fleshy appendage ended with a bait.
- The bait hangs in front of the mouth and swings in all directions.
- If another fish tries to capture this bait, the angler fish swallows it in no time.

Mullerian mimicry

- In **Müllerian mimicry, two or more** unpalatable species, such as the cuckoo bee and yellow jacket, resemble each other.

Presumably, the more unpalatable prey there are, the more quickly predators learn to avoid prey with that particular appearance.

Advantages

- Based on a reduction in the number of trials required by a young predator in learning to avoid inedible species.
- Both the individuals are not destroyed by the predators.

(i) Batesian mimicry
(ii) Müllerian mimicry

Batesian mimicry

Many unprotected species resemble distasteful species (Fig. 16.11). Both display warning colouration. The mimics, when among a large population of models are avoided by predators. Such a pattern of resemblance is called **batesian mimicry** after the British naturalist H.W. Bates. Batesian mimicry is exhibited by harmless snakes which mimic poisonous snakes. The poisonous snakes of the genus *Elaps* are beautifully coloured with alternating red and black bands. Several harmless colubrid snakes have similar colours and though not exactly identical, the similarity is sufficiently close to fool the predator.

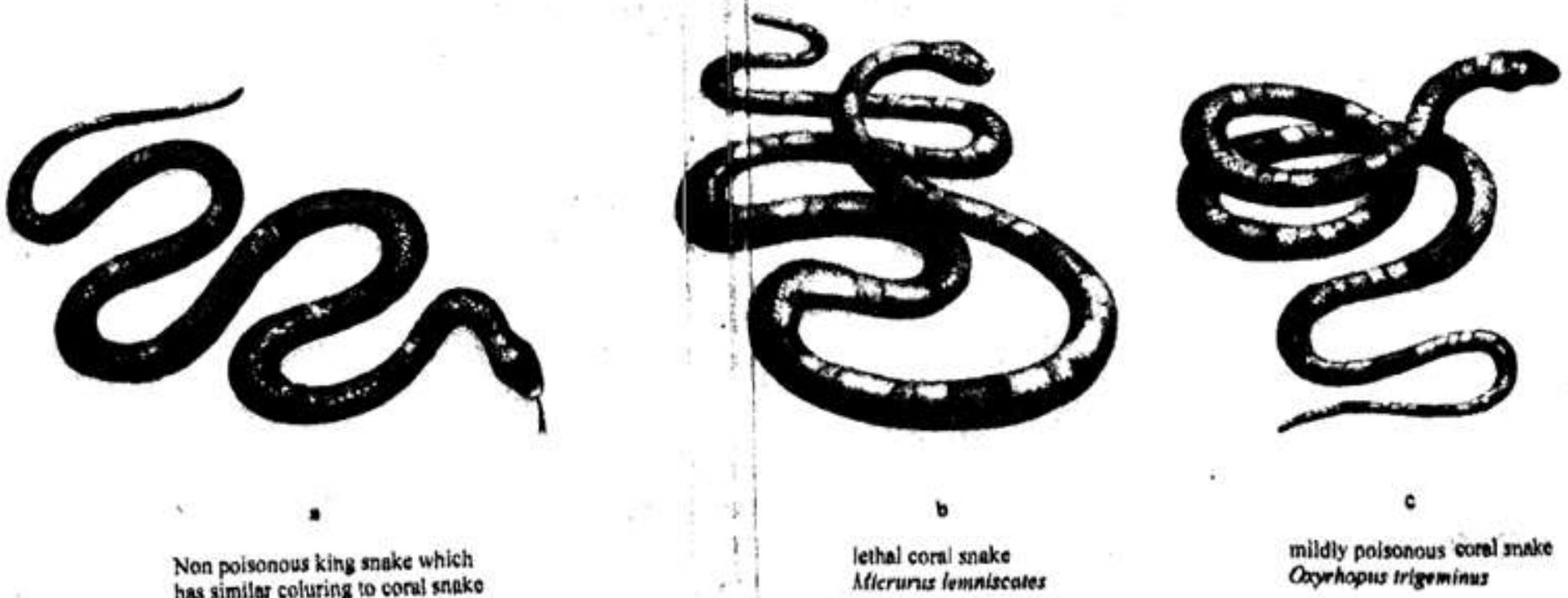

Fig. 16.11: Batesain mimicry exhibited by the (a) non poisonous, harmless king snake which resembles two types of coral snakes (through not related to them) (b) the highly lethal *Micrurus leniscatus* and (c) the mildly poisonous *Oxyrhopus trigeminus*.

Müllerian Mimicry

This form of mimicry is named after the German biologist, Fritz Müller. Müllerian mimicry is defined as a phenomenon in which two or more unrelated but protected species resemble each other thus achieving a kind of 'group defence'. If animals resembling each other are all poisonous or dangerous, they still gain an advantage by resembling each other as it affords collective protection.

In both Batesian and Müllerian mimicry, mimic and model must not only look alike but also behave or act in a similar fashion if predators are to be deceived. Also mimics have to spend most of their time in the same habitats as their models. Further more they should be greater in number. If they do not fulfill both these conditions the predators would discover that mimics living in a particular area are palatable!

BATESIAN MIMICRY VERSUS MÜLLERIAN MIMICRY

BATESIAN MIMICRY	MÜLLERIAN MIMICRY
A form of mimicry where a harmless animal mimics a dangerous animal in order to avoid predators	A form of mimicry where two unrelated dangerous animals develop similar appearances as a shared protective device
Exhibited by harmless animals	Exhibited by harmful animals
Mimic benefits	Both mimic and predator benefit
Model should be abundant than the mimic	Both predator and mimic may be equally abundant
A type of parasitic relationship	A type of mutualistic relationship
Ex: Harmless Therea beetle mimics noxious Tortoise beetle	Ex: Red postman butterfly and common postman butterfly

Thank you