

Protective Adaptation

Colouration is one of the protective adaptations which has been protective value for harmonizing with surrounding. The effect of colouration is concealment because the animal becomes indistinguishable from the background.

In polar regions, the animals like polar bear, polar fox etc are white and thus are invisible in the white background of the snow. Tree snakes, tree frogs, grasshoppers, caterpillars etc. living in foliage have green colour and show concealing effect. Many desert animals have light brown or sandy colour which harmonises with the sand. Sometimes, counter shading and disruptive colourations also help for concealment. Many insects inhabiting barks of trees harmonize with the colour of bark.

Types of animal colouration

Animal colouration is of 3 types.

1. Structural colours
2. Iridescent colours
3. Integumentary colours.

Structural colours. In many insects and birds, few colours are generated by the physical constitution of surface layer by reflecting certain wavelengths of light and eliminating others. They are known as structural colours.

Iridescent colours. Such colourations are produced due to reflection of light from many layers of thin, transparent film. Mostly brilliant colours are produced due to phase interference when light wave weakens or eliminated to produce colours.

Integumentary colours. These are produced by pigments or biochromes which reflect light rays. Such pigments are seen in branched chromatophores of crustaceans and some vertebrates. They may be concentrated in the centre of the cell or dispersed throughout the cell and its processes but in Cephalopods, chromatophores have a sac-like cell filled with pigment granules surrounded by muscle cell.

Following types of pigments are seen in different animals:-

1. **The Melanins.** Black or brown coloured group of polymers producing earth coloured shades in the body of animals.
2. **The Carotenoids.** These are yellow and red colour producing pigments contained in special pigment cells called Xanthophores. Vertebrates receive this from plants because they are unable to synthesize this pigment.
3. **Iridophores.** They contain crystals of guanine or some other purine rather than pigment which gives silvery or metallic effect to the body by reflecting light.

Besides these three important classes of pigments, there are other classes called Ommochromes and pteridines which are seen in molluscs and arthropods producing yellow pigments of the body. The green colour of the body which is of rare occurrence is produced by the combination

of yellow pigment overlaying blue structural colours.

Camouflaging :-

Many animals living in sandy places have a light brown colour, as is seen in some lizards. The green lizard is like the grass and the snake is inconspicuous among the branches. The spotted leopard is suited to the interrupted light of the forest.

Gradual colour change :-

Some animals change their colour gradually with the change of the surrounding. The young common shore crab show many different colours. It may be green or grey red or brown depending on the colour of the rock pool where they are inhabiting.

Seasonal colour change :-

Some animals change their colour seasonwise. e.g. the mountain hare may escape the fox more readily because its whiteness makes it very inconspicuous against the background of snow.

Rapid colour change

Highest level of rapid colour change occurs among lizards. Chameleons are the good example of rapid colour change.

Warning and signalling colouration :-

There are also protective colours of warning and of recognition. Some insects have warning colours of red, yellow or black advertise to unpleasant taste, toxic and bad smell.

MIMICRY

The meaning of mimic is imitation. The imitating individual is called mimetic form or mimetes. The object which is imitated or copied is called Model or Mimicked. The phenomenon in which animal resembles some other animal, plant or other natural objects of the same habitat is called Mimicry. Resemblance is in colour markings, shapes, size, structure and other details. The word mimicry comes from the Latin word "Mimicus" or Greek word "Mimikos", meaning to imitate closely.

Mimicry can be classified into following three categories.

1. Protective mimicry
2. Conscious mimicry
3. Aggressive mimicry.

1. Protective Mimicry :- Here animal mimics some other organisms or the natural objects in form, colour or behaviour. By doing this they protect themselves from predation. It is obtained either for camouflaging or concealment or for warning.

Camouflaging is common in animal kingdom. Here animal conceals itself by matching its colour with the background.

Sometimes, animal mimics the living or dead objects. Several butterflies are leaf-like in appearance resembling either a dead or withered leaf or its petioles. As for example Kallima parlecta it resembles a dry leaf.



Warning Mimicry - Here, nonpoisonous and harmless organisms mimic the poisonous and harmful organisms; palatable (edible) organisms resemble to be non-palatable. This is very common in reptiles. For example: Heterodon, which is a non-poisonous snake, flattens its head and hisses like a poisonous snake.

Conditions for protective Mimicry

1. Mimicker and 'Model' must occur in the same habitat.
2. Mimickers are always more defenseless and the 'model' is avoided by enemies.
3. Mimickers should be in lesser numbers, otherwise bluff will be exposed.
4. Imitation should be external and visible.

CONSCIOUS MIMICRY -

Many animals behave as dead bodies when they feel any danger. Some beetles drop like pebbles, when they are about to be captured and lie inert after falling.

AGGRESSIVE MIMICRY -

It is mostly exhibited by the carnivorous animals like fishes, spiders etc. They either conceal themselves to the surroundings or allure the prey. It is of two types.

- (a) Concealing Mimicry
- (b) Alluring Mimicry

Concealing Mimicry - On this type of mimicry cryptic colours are developed in animals to blend with the surroundings so that they are not easily differentiated.

It helps the animals in getting their prey easily. As for example a species of beetles resemble wasps. However, the resemblance is always superficial and never anatomical in character.

Alluring mimicry — Here, animal camouflaging with the surrounding and possess some lure to attract its prey so that the misled animal falls a victim to the mimicker. Laso and Bolo spiders show this type of mimicry.

Causes of Mimicry —

Different workers have given different opinions. Weismann was of the opinion that Natural Selection is only reason responsible for production of mimicry. However, whatever the cause may be secondarily operating, resulting in colouration and mimicry, Natural Selection is the main cause.