

# ANIMAL DEFENSE AGAINST PREDATORS





# Animal Defense Against Predators

Throughout millions of years of evolution, animals have evolved numerous ways of defending themselves against predators. Obviously, being able to flee a predator is the choice of many prey animals we can consider.

However, there are some often overlooked but interesting methods of defense which involve deception and chemistry. These include using **toxic chemicals**, **camouflage**, and **mimicry**.



# **Animal Defense Against Predators**

Presented here are several descriptions  
and  
examples of animal defense.



# 1. Chemical Defense

- ◆ There are two main ways animals can use chemicals to defend themselves.
- ◆ Animals can **synthesize toxin** using their own metabolic processes, or they can **accumulate toxin** from the food they eat.

# 1. Chemical Defense

- Animals which **synthesize their own toxin** are able to convert chemical compounds in their body to a poison.
- ▶ There are many amphibians that produce skin toxins. The skin toxins are produced by special poison glands, usually located on the animal's back or throughout the skin.



Photo courtesy of Dr. John Daly

The poison dart frog has poison glands scattered all over its body.

# 1. Chemical Defense

In another example, the fire salamander makes a nerve poison, which it can squirt from glands on its back.



Photo courtesy of Henk Wallays, Cal. Acad. of Sciences.

# 1. Chemical Defense



Photo courtesy of T. W. Davies, Cal. Acad. of Sciences.

Many animals **accumulate toxin** from their food rather than synthesizing it from scratch.

For example, the larvae of Monarch butterflies accumulate toxins from the plants they inhabit. Birds that eat the Monarchs vomit and learn to avoid them in the future. Their bright coloration allows birds to remember and avoid them.



# 1. Chemical Defense

- ▶ Interestingly, many organisms which are distasteful advertise this fact to predators by having bright body colors or markings, as if to say, "Notice me! I'm dangerous!"



# 1. Chemical Defense

You can see this in the bright colors of the Monarch and the poison dart frog.



Photo courtesy of T. W. Davies, Cal. Acad. of Sciences.



Photo courtesy of Dr. John Daly

# 1. Chemical Defense

This is called “**aposematic coloration**”, and is widely used among the insects and amphibians.

The Cream-spot Tiger is aposematically colored.



## 2. Camouflage

Animals that camouflage themselves pretend to be something they are not. Either their **coloration**, marking patterns, or **entire body** resembles something else in their environment, here a leaf, an owl.



## 2. Camouflage

Here an aptly named walking stick pretends to be a twig, in an attempt to avoid being seen by a bird or other predator. This is an example of *cryptic coloration*.



Photo courtesy of Dr. Lloyd Glenn Ingles, Cal. Acad. of Sciences.

## 2. Camouflage

In this picture, a four-eyed butterfly fish uses *deceptive markings*.

The large spot near the tail resembles an eye. When predators attack the wrong end, the butterfly fish can swim away in the other direction!



## 2. Camouflage

Some **predators** also depend on camouflage, but this time it is in order to avoid being seen by their prey.



Here, a frogfish resembles a sponge. Small fish swimming nearby will be engulfed in the frogfish's enormous mouth!



## 3. Mimicry

In mimicry, an organism (the mimic) closely resembles another organism (the model) in order to deceive a third, (the operator). The model and the mimic are not always closely related, but both usually live in the same area. This is similar to camouflage, but in mimicry the model is generally a similar organism rather than a static part of the background environment.



## 3. Mimicry

There are several types of mimicry.  
The two most common types are  
**Batesian mimicry** and  
**Mullerian mimicry**.



John H. Tashjian

## 3. Mimicry

**Batesian mimicry** occurs when an edible mimic resembles an unpalatable or poisonous model. In this type of mimicry, only the mimic benefits.

An example of **Batesian mimicry** is the scarlet king snake, a non-poisonous mimic of the extremely venomous coral snake.



Above: scarlet king snake  
Right: coral snake

Photo courtesy of John H. Tashjian,  
Cal. Acad. of Sciences.

# 3. Mimicry

Another example of **Batesian mimicry** is the locust borer. This insect not only looks like a bee or wasp, it sounds like one, too!





## 3. Mimicry

By contrast, **Mullerian mimicry** occurs when two (or more) distasteful or poisonous organisms resemble each other. Both species benefit because a predator who learns to avoid one species will most likely avoid the other, too.

### 3. Mimicry



The two invertebrates on the left are different species of sea slugs, while the one on the right is a marine flatworm. All three secrete noxious substances and are unpalatable. Notice their similar **aposematic coloring**.



# Review and Summary

Three types of defenses that animals can use against predators include:

## Chemical defense

including synthesizing toxins and accumulating toxins from food



# Review and Summary

Three types of defenses that animals can use against predators include:

## **Camouflage**

including cryptic coloration and deceptive markings



# Review and Summary

Three types of defenses that animals can use against predators include:

**Mimicry**

including Batesian and Mullerian mimicry



# Review and Summary

Three types of defenses that animals can use against predators include:

Chemical defense

Camouflage

Mimicry

Animals constantly evolve new and improved characteristics to capture prey or evade predators; the ongoing “arms race” has produced some of the wonderful organisms you have just seen!