



Can You See Me Now?

Nature's Game of Hide-and-Seek

Jacob Hurst (jah459@cornell.edu)

Animals have developed a variety of methods for avoiding death at the jaws of a hungry predator. These methods of avoiding predation can be examined in the context of the different stages of a predation event: Detection, Attack, Capture and Consumption. Animals use different colors and patterns to disrupt each of the stages of predation.

Avoiding Detection

If a predator does not notice a prey animal the prey animal does not have to worry about outrunning or fighting a predator. Thus, many animals choose to hide from predators. Animals that hide from predators use camouflage, also known as crypsis, to blend in with their surroundings. Background matching, disruptive coloration and transparency are all aspects of camouflage that help a prey animal hide from predators.



Background matching is a type of camouflage in which an animal hides by resembling its environment in color, shape, or movement. The Eastern Screech Owl hides during the day by matching the color and pattern of tree bark, while

the Orange Oakleaf Butterfly hides from predators by matching the color and



shape of leaf litter found on the forest floor.

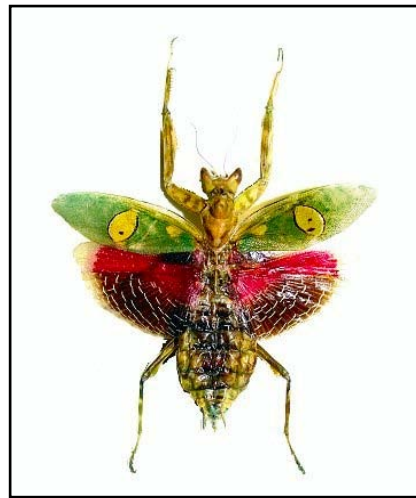
Disruptive coloration breaks up the body shape of an animal with contrasting stripes or patches of color. This makes them harder to spot because they do not appear to fit the shape for which a predator is searching. This jumping spider uses disruptive coloration to hide from predators and its prey. The irregular patches of color on the top of this flounder break up the outline of the fish and make it almost indistinguishable against the ocean floor.



Transparency is the total lack of color to the point of near invisibility. Predators quite literally see through these animals. This method of hiding is quite common in open aquatic habitats because there is nothing for animals to hide behind and no background against which they can blend. Copepods, which are found in waters worldwide, are an excellent example of transparency. Terrestrial examples are less common, but do occur. Glasswing butterflies have transparent wings that make them very difficult to spot against a variety of backgrounds.

Avoiding Capture

Camouflage is a great way to avoid detection by predators. Unfortunately, it does not always work. A camouflaged animal that is hiding can be found out by a predator, and when that happens, the camouflaged animal is in a life-threatening situation. Many animals have developed ways to escape if they are discovered. Many animals try to frighten predators by flashing unexpected color or patterns, which sometimes resemble owls or other predators. While the predator may not be fully convinced by a startle display, if it hesitates for even a few seconds, its prey has time to get away.



Startle coloration is the use of bright patches of color, often in striking patterns, to frighten a predator. These patches of color are kept hidden until an animal feels threatened, in which case the colors are suddenly revealed. The Io Moth reveals brightly colored eyespots when it feels threatened and the flower mantis flashes its red and black hindwings when it senses danger. If a predator is frightened or hesitates, both of these animals will flee to safety.

Avoiding Consumption

If an animal cannot avoid detection or capture, it is in serious danger of becoming a meal. When all else fails, some animals sacrifice a tail, fin, leg or wing in order to escape with their lives. Many animals use special markings or bright colors to draw a predator's attention to a non-essential body part.



Deflection is when an animal draws a predator's attack to a specific body part through bright colors or a distinctive pattern. If a predator captures a juvenile five-lined skink, it is most likely attack the bright blue tail instead of the less colorful head. The skink can then drop its tail and run away. Skinks can easily live without a tail, but not without a head, so deflecting attacks to the tail is a very successful strategy. The owl butterfly uses eyespots to draw predators away from its delicate body. If a predator attacks, it will most likely go for the eyespots and receive a mouthful of wing, while the butterfly gets out of the ordeal alive.

Preventing Attack

Animals have developed a wide variety of methods to avoid predation through stealth or surprise, but some animals see to prevent an attack altogether. They do not bother hiding and are usually very brightly colored. They also tend to have some sort of defense against predation, such as a bad taste, stinging hairs, burning chemicals, or deadly toxins.



Warning Coloration, also known as aposematism, is a pattern or color combination that signals to predators that a prey animal is toxic or has some unpleasant or dangerous defense. Typical colors used to warn predators are red, black, yellow, and orange, usually in some combination of those colors. Predators usually have to eat one animal with warning coloration before they figure out what the bright colors mean. After one unpleasant encounter, most predators learn to avoid animals with warning coloration. The Monarch Butterfly advertises the bitter compounds it accumulated as a caterpillar with contrasting black and orange coloration and the poison dart frog warns predators about its deadly skin secretions with its bright red skin.

Some animals have the same colors and patterns as other, unrelated species. When one animal resembles another animal in color, pattern, or shape, it is known as **mimcry**. For animals with warning coloration, there are two forms of mimicry: Batesian and Mullerian.



Batesian Mimicry involves one toxic animal and one perfectly palatable animal that copies it. In this way, the palatable animal is mistaken for the toxic or dangerous animal and is avoided by predators. The hover fly(right) mimics a bee (left).

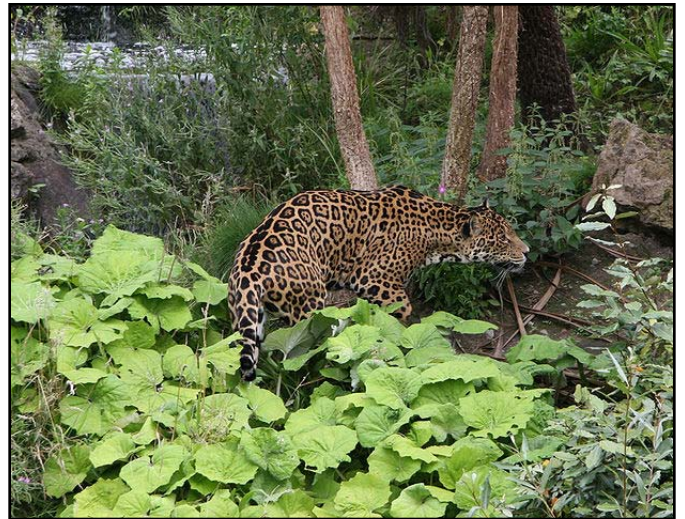


Mullerian Mimicry is when multiple poisonous or dangerous species have similar colors, patterns or shapes. This

offers better protection by giving predators a more universal appearance to avoid. For example, if an predator eats a wasp and gets stung, it will later avoid any animal that has a pattern that looks like that of a wasp, which includes bees.

Predators Use Camouflage and Mimicry Too!

Predators that hide from their prey can get closer to their targets than undisguised predators, and are more likely to have a successful hunt.



Many predators have markings that camouflage them as they stalk their prey. The stripes and spots on tigers and jaguars help them blend into the shadows as they hunt.



Some predators mimic non-threatening objects or animals in the environment to fool prey animals. This is known as **aggressive mimicry** and allows the disguised predator to get close to its prey to deliver a fatal attack. The Alligator Snapping turtle lures fish into its mouth by wiggling its worm-like tongue. Flower mantises resemble the flowers on which their prey feed.

Camouflage crafts and activities:

<http://www.anapsid.org/pdf/camoflage.pdf>

http://www.montereybayaquarium.org/lc/activities/sharks_hidearay.asp

Protective Coloration interactive web module:

<http://www.museum.state.il.us/flashapps/clink/protectiveColoration.swf>

Naturalist Outreach STEM videos:

Reptiles: Diversity, Feeding, Defense – Starring Anna Kusler and Jessica Tingle

<http://youtu.be/NdVtu30fe-o>

Avoiding Predators: How to Avoid Being Eaten – Starring Jacob Hurst & Heather Connelly

<http://youtu.be/B2JdRPKYyTc>

Fungus in your life – Starring Jacob Benedict

<http://youtu.be/iiBoD0fM2IA>

Seed dispersal – The great escape – Starring Meredith Kueny

<http://youtu.be/xY4JFOSuqvY>

Whale song and diversity – Starring Anna Plattner

http://youtu.be/b_1gjiO_3j4

Insect Detectives – Starring Heather Connelly and Rakim Turnipseed

<http://youtu.be/HpHnnhdumM>

So many kinds of bees! – Starring Margarita Lopez-Uribe

<http://youtu.be/6Oo75z4tgRs>

All about bats – Starring Alyson Brokaw

<http://youtu.be/EJu5qZ5FZxw>

Skull detectives – Understanding mammal skulls – Starring Serena Brady & Victoria DiCamillo

<http://youtu.be/wtABI5quQAU>

Photos from Wikimedia Commons