Camouflage

In nature, every advantage increases an animal's chances of survival, and therefore its chances of reproducing. This simple fact has caused animal species to evolve a number of special adaptations that help them find food and keep them from becoming food. One of the most widespread and varied adaptations is natural camouflage, an animal's ability to hide itself from predator and prey.

In this article, we'll see how animals blend in with their environment so that others might overlook them. We'll look at a few sophisticated hiders who can change their camouflage in accordance with a change in their surroundings. In addition to these expert hiders, we'll look at some animals who don't hide at all, but throw predators off by disguising themselves as something dangerous or uninteresting.

Concealing Colors

Most animal species in the world have developed some sort of natural camouflage that helps them find food and avoid attack. The specific nature of this camouflage varies considerably from species to species.

There are several factors that determine what sort of camouflage a species develops:

- Camouflage develops differently depending on the physiology and behavior of an animal. For example, an animal with fur will develop a different sort of camouflage than an animal with scales, and an animal that swims in large schools underwater will develop different camouflage than one that swings alone through the trees.
- An animal's environment is often the most important factor in what the camouflage looks like. The simplest camouflage technique is for an animal to match the "background" of its surroundings. In this case, the various elements of the natural habitat may be referred to as the **model** for the camouflage.
- Since the ultimate goal of camouflage is to hide from other animals, the physiology and behavior of an animal's predators or prey is highly significant. An animal will not develop any camouflage that does not help it survive, so not all animals blend

in with their environment the same way. For example, there's no point in an animal replicating the color of its surroundings if its main predator is color-blind.

For most animals, "blending in" is the most effective approach. You can see this sort of camouflage everywhere. Deer, squirrels, hedgehogs and many other animals have brownish, "earth tone" colors that match the brown of the trees and soil at the forest ground level. Sharks, dolphins and many other sea creatures have a grayish-blue coloring, which helps them blend in with the soft light underwater.

There are two ways in which animals produce different colors.

- **Biochromes**, which are microscopic, natural pigments in an animal's body, produce colors chemically. Their chemical makeup is such that they absorb some colors of light and reflect others. The apparent color of a pigment is a combination of all the visible **wavelengths** of light that are reflected by that pigment.
- Animals may also produce colors via microscopic physical structures. Essentially, these structures act like prisms, refracting and scattering visible light so that a certain combination of colors are reflected. Polar bears, for example, actually have black skin but appear white because they have translucent hairs. When light shines on the hairs, each hair bends it a little bit. This bounces the light around so that some of it makes it to the surface of the skin and the rest of it is deflected back out, producing white coloration. In some animals, the two types of coloration are combined. For example, reptiles, amphibians and fish with green coloration typically have a layer of skin with yellow pigment and a layer of skin that scatters light to reflect a blue color. Combined, these layers of skin produce green. To learn more about coloration and light, check out How Light Works.

Both physical and chemical coloration is determined genetically; they are passed on from parent to offspring. A species develops camouflage coloration gradually, through the process of **natural selection**. In the wild, an individual animal that more closely matches its surroundings is more likely to be overlooked by predators, and so lives longer. Consequently, the animal that matches its surroundings is more likely to produce offspring than an animal that does not match. The camouflager's offspring will likely inherit the same coloration, and they will also live long enough to pass it on. In this way, the species as a whole develops ideal coloration for survival in their environment.

The means of coloration depends on an animal's **physiology**. In most mammals, the camouflage coloration is in the **fur**, since this is the outermost layer of the body. In reptiles, amphibians and fish, it is in the **scales**; in birds it is in the **feathers**; and in insects it is part of the **exoskeleton**. The actual structure of the outer covering may also evolve to create better camouflage. In squirrels, for example, the fur is fairly rough and uneven, so it resembles the texture of tree bark. Many insects have a shell that replicates the smooth texture of leaves.

Camouflaging coloration is very common in nature -- you see it to some degree in the majority of species. But it is much less common for an animal to be able to change its coloration to match a changing environment. In the next section, we'll look at a few of the animals that use this sort of adaptive camouflage.