DAVID BRISLANCE

Color by Nature

By Mary Hoff

Why are a robin's eggs blue? Why do weasels turn white for winter?

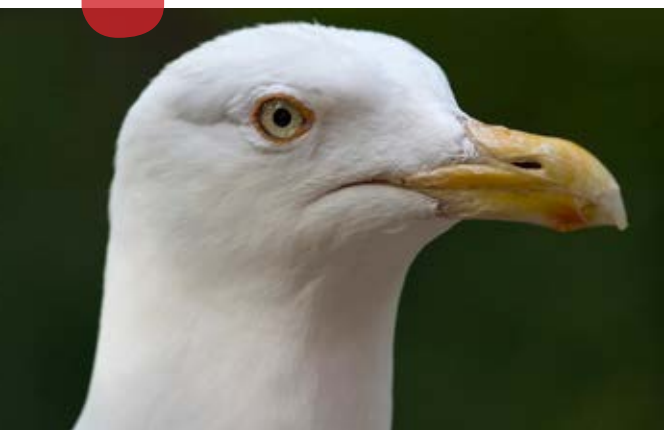
Color helps plants and animals in many ways. The color of fur, feathers, scales, or skin helps some animals hide. Color can help animals stand out. Bold colors can send messages: "Eat me!" or "Feed me!" "Come here!" or "Go away!" Color can provide plants with food and protect animals from being harmed by too much sun.

One main source of color is a category of chemicals called *pigments.* A rainbow of light waves of different lengths makes up sunlight. Pigments absorb some parts of the rainbow and reflect others. We see the colors a pigment reflects.

Objects can cause light waves from different parts of the rainbow to travel in different directions. The color we see as a result is called *structural color.* For example, the male ruby-throated hummingbird has a bright red throat, or chin. Tiny bubbles in the feathers under the bird's chin change the path of red light waves in a way that makes it brighter to our eyes. The bubbles change the path of other colors in ways that make them harder to see. Sometimes the red light sparkles like a dark red stone called a ruby.

Traits that help living things survive and reproduce are called *adaptations.* Let's explore nature's rainbow of colors and some of the ways in which color serves as an adaptation.

Red marks the spot



DAVID BRISLANCE

A **herring gull** glides over the water and pokes among the pebbles along the shore of Lake Superior. It is gathering tiny fish, insects, and organic debris for dinner. After the big bird has had its fill, it returns to its lakeside nest where its mate and three chicks wait.

As the parent gull leans over the nest, one of the chicks spies the red spot on its bill and starts to peck at it. *Tap! Tap! Tap!* The pecking makes the parent spit up partially digested food for the nestling to eat. Probably not the way you'd like to get your meal—but it works for herring gulls.

The red spot serves as a *visual cue* for baby gulls. The color grabs their attention and gives them a way to tell the parent gull that they're ready to eat.

Both parents feed their young. After about three months, the youngsters are old enough to take care of themselves.

Think about it.

Western grebe chicks have a bald spot atop the head. What does it mean when the spot turns red?

Surprise

Red-bellied snakes live throughout most of Minnesota, taking shelter under logs and leaf litter. They eat slugs and hibernate in burrows and anthills. Red-bellied snakes are mostly brown, but their undersides are bright red. When a crow, raccoon, or other predator threatens, the red-bellied snake flips itself over and shows its belly and tail. The flash of red startles the predator, giving the snake a chance to escape.

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Yuk or yum?

What message does the color orange send? It depends.

A **lady beetle** crawls across a leaf, gobbling up smaller insects called aphids like cookies on a plate. The beetle's bright orange coloring makes it easy for insect-eating birds and other animals to see. But that doesn't mean the beetle gets eaten. That's because it contains chemicals that taste bad and can make other animals sick. Instead of saying, "Come get me!" the bright color works like a Mr. Yuk sticker, telling predators to stay away. This kind of coloration is a warning or *aposematic coloration.*

ALLEN BLAKE SHELDON

Blossoms of **butterfly milkweed** are orange too. But these wildflowers are not trying to scare anything away. Deep inside the flower is a rich feast of nectar. When butterflies and bees zoom in to gather the sugary food, they also spread pollen from one milkweed flower to another so milkweed plants can make seeds. To these pollinators, the orange color, known as *advertising coloration,* is like a restaurant sign: "Eat here!"

In both lady beetles and butterfly milkweed, pigments called *carotenoids* produce the orange color. Food that contains carotenoids can help you stay healthy. Can you think of anything you eat that contains carotenoids? (Hint: One sounds a lot like *carotenoid.*)

Think about it.

Name another Minnesota plant or animal that is at least partly red. How do you think the color helps it survive?

BILL JOHNSON

Think about it.

What are other examples of aposematic coloration in nature?

B o l d Yellow Fellows

What mating message does the color yellow send? It depends.

Flash! A splash of yellow swoops in to the bird feeder. It's midsummer, and a brightly colored **male goldfinch** is searching for seeds. But that's not all he's looking for. His glowing feathers signal to potential mates: "Look at how strong and healthy I am. That's why I can make such bright yellow feathers."

Scientists have found that the yellower a male goldfinch's color, the healthier he is. The feathers help females figure out which strong, healthy male would make the best father for their babies.

TOP AND BOTTOM: DAVID BRISLANCE

Male goldfinches are not always sunshine yellow. Their bright yellow feathers sprout in spring in time for mating season. In early fall these feathers fall out, and drabber gray-green ones replace them—until spring mating season comes again and the cycle starts over.

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A **male green frog** floats on a pond, his head and bright-yellow throat visible above the water's surface. If another male green frog swims into his territory, he lifts his head high to show his yellow throat. Just like a No Trespassing sign, the bright color could be a warning to the visitor that the territory is already taken. It also could be a way to attract mates.

G r e e n Is for Growing

LYCOPODIUM BY MICHAEL FURTMAN

Green is a beautiful color, but plants don't wear it just for looks. The pigment that makes plants green, called *chlorophyll,* absorbs light waves in the red and blue parts of the rainbow. Those waves have just the right amount of energy to turn water and carbon dioxide into sugar with the help of chemicals found inside plant leaves. The plant then uses the sugar to grow.

Long-horned Grasshopper

Can you find the grasshopper in this picture? If not, don't feel bad—neither can insect-eating birds. The grasshopper's green color is an example of camouflage. It helps it hide among leaves during the day.

Can you name two more Minnesota animals that use green as camouflage?

ALLEN BLAKE SHELDON

Tale of a Tail

ALLEN BLAKE SHELDON

One of the most astounding blues found in nature shows up on the tail of a young **common five-lined skink.** Black or dark brown with five light stripes, this lizard lives in southern and central Minnesota. What's the blue tail all about?

Scientists found a clue in the fact that skinks have a blue tail when they hatch, but the bright color fades or disappears completely as they grow to be adults. Testing various combinations of adult and young skinks, they concluded that the blue tail serves as a signal to aggressive adult male skinks to not attack tiny young skinks.

Some herpetologists think the bright blue tail also helps a baby skink survive by drawing a predator's attention away from the main part of the skink's body. If a red fox or a snake grabs or bites a skink's tail, the tail easily breaks off. The predator is left holding the tail, and the skink scrambles away. The skink survives and grows a new tail!

DOUG LOCKE, DEMBINSKY PHOTO ASSOCIATES

Travels of an Egg

As a robin egg travels down the mother bird's oviduct toward the outside world, it gathers a pigment called *biliverdin.* The pigment dyes the eggshell blue. No one knows for sure how the blue color helps robin eggs survive. Some scientists think the blue helps camouflage eggs in the nest, so raccoons and other predators are less likely to find them. Other scientists think the blue color protects the eggs from harmful rays from the sun.

Experiments have shown that male robins take better care of baby birds that they think hatched from brighter blue eggs. Perhaps the male recognizes bright blue as a sign that the mother bird was healthy enough to produce a lot of biliverdin, and so the babies are likely to be healthy enough to survive with his care.

Purple Blueberries

Wild blueberries turn purple when ripe. Scientists don't know for sure why blueberries are purple. Some say the color, which is made by pigments called *anthocyanins,* helps bears and other berry-eating animals find blueberries. The berry eaters do not digest the tiny seeds within the blueberry. So the animal's droppings spread the seeds to new places. Then seeds can sprout and grow new blueberry bushes.

Some scientists think the anthocyanins help keep the blueberry plant healthy by protecting the berries from harmful rays from the sun or by blocking unhealthy chemical reactions caused by interaction with their environment.

Whatever the adaptive value for the blueberry, the color purple is good news for you and me. That's because anthocyanins help keep us healthy when we eat them.

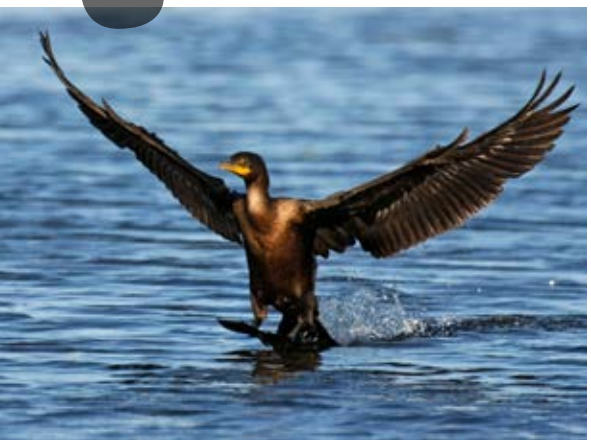
BILL MARCHEL

LEFT: MARSH MARIGOLD BY RICHARD HAMILTON SMITH. RIGHT: ULTRAVIOLET PHOTO OF MARSH MARIGOLD BY DAVID KENNARD.

Ultraviolet Light

Some flowers, including marsh marigolds, have patterns made from pigments that reflect ultraviolet light, which humans can't see but some other animals can. Bees and other insects use these patterns as guides to find nectar hidden inside the blossom.

Soaking Up Rays



MICHAEL FURTMAN

Propelled swiftly underwater by its webbed feet, a **double-crested cormorant** snaps up a minnow meal with its hooked bill. After coming to the lake's surface, the black bird perches on a rock and spreads its wings out to dry. Because black pigments absorb all of the colors that make up sunlight, the warm rays quickly dry the cormorant's feathers. Soon the bird can use its feathers to fly again.

Think about it.

What color absorbs all of the colors in the rainbow? What color reflects all of the colors in the rainbow?

LEFT AND RIGHT: DAVID BRISLANCE

Snow Whites

Many animals' colors help them blend into their surroundings, so they can hide when hunting and when being hunted. Minnesota's **short-tailed, long-tailed, and least weasels** have an amazing way of making this work in a changing world.

In summer a weasel is mostly brown, making it hard for hawks, foxes, and other predators to spy against tree trunks and dried leaves and grasses. As daylight hours shorten in fall, something surprising happens. The weasel's brown fur falls out, bit by bit, and new white fur grows and replaces it. By winter, the weasel is almost all white and blends in with the snow.

In both the long-tailed and the short-tailed weasel, the tip of the tail stays black all year. What might be the adaptive value of a black tail tip in a snow-white world? (Hint: What would an owl or a hawk focus on during an attack?)

How does a weasel know when it's time to turn white? A tiny structure in its brain called the *pineal gland* senses the decreased daylight of fall. Then the gland releases a chemical that starts changes within the weasel's body. The changes eventually block the production of pigment in the animal's fur-making cells, so its new fur grows in white. In spring, as the days grow longer, the pineal gland senses the increased daylight. Then it releases less of the pigment-blocking chemical, and fur begins to grow in brown again.

Think about it.

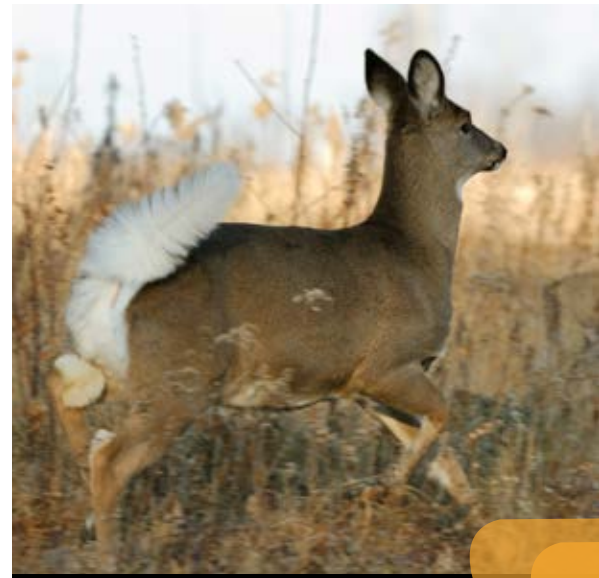
Albino animals, such as white squirrels, lack dark pigments. Why do you think albino animals are so rare?

White Flag

When a white-tailed deer detects an approaching predator, it holds its tail upright, exposing a bright white patch beneath. Why would a deer want to be more visible when it's in danger? After studying deer of different ages in various situations, scientists think that flashing a white tail, a behavior known as flagging, is a way for the deer to tell a predator that it knows it's there. Because deer are swift runners, the white tail might cause the predator to look for an easier meal.

Teachers resources:

Teachers guide:
mndnr.gov/young_naturalists



Think about it.

Can you name a way color helps you survive?

BILL MARCHEL