

Blueberries can  
help cure “the blues”!

Flavonoids are plant pigments responsible for shades of blue and purple. Found in foods such as berries, pecans, grapes, and dark chocolate, flavonoids can enhance your mood and are known to help reduce the risks of cancer and heart disease.






Ultramarine is an intensely blue pigment made from lapis lazuli, a mineral mined mostly in Afghanistan. It's been used in art throughout Asia, Europe, and Africa at least from the time of the Sumerian empire in Mesopotamia. During the Renaissance artists avoided having to use inferior pigments by specifying in their contracts that patrons purchase ultramarine.



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When light travels through our atmosphere, it refracts from tiny particles in the air. These scatter shorter wavelengths of light, like blues and violets—so we see the sky as blue. When the atmosphere is full of larger particles, like water droplets in clouds, or dust particles, the larger particles scatter all wavelengths of light equally, so the sky appears paler, or even white.

The berries of *Pollia condensate*, native to Africa, reflect an amazing amount of light, so much so that these deep blue berries are the most intensely colored living thing that scientists have yet to measure.


The blue color is due to the angle of the refracted light.



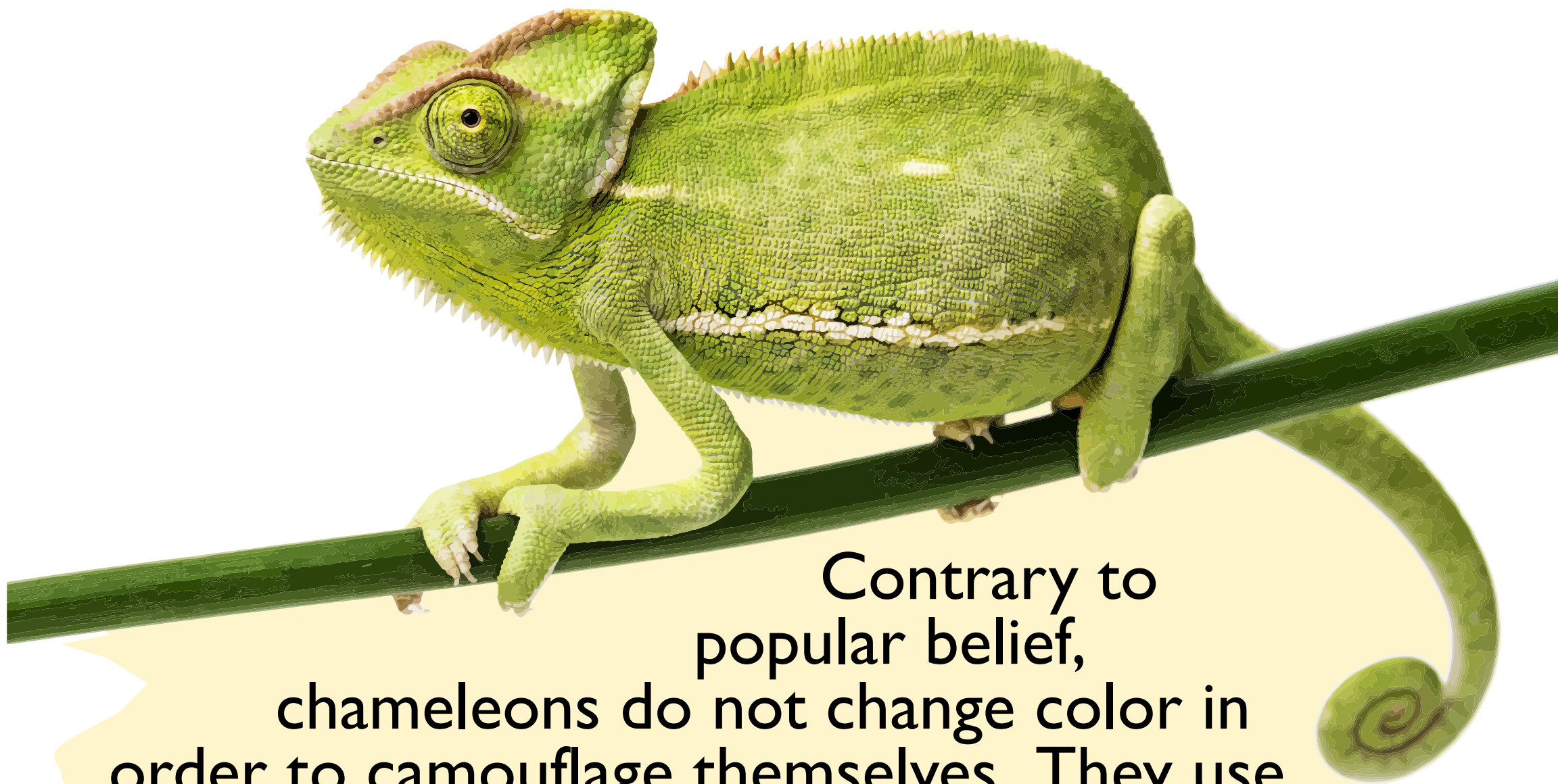
It's hard to find a true blue flower: less than 10% of all flowering plants produce blue flowers.



There are no true blue plant pigments, so producing blue flowers is tricky. Native to the cold, mountain climates of China and Tibet, this beautiful blue poppy (*Meconopsis betonicifolia*) won't survive in Richmond.



Indigo, derived from the indigo plant (*Indigofera tinctoria*), is one of the most famous and widely used dyes throughout human history. The Tuareg of North Africa use indigo to dye their robes deep blue. Deeper blue robes indicate a higher social status. Tuareg actually welcome the blue rubbing off on their skin and staining it!



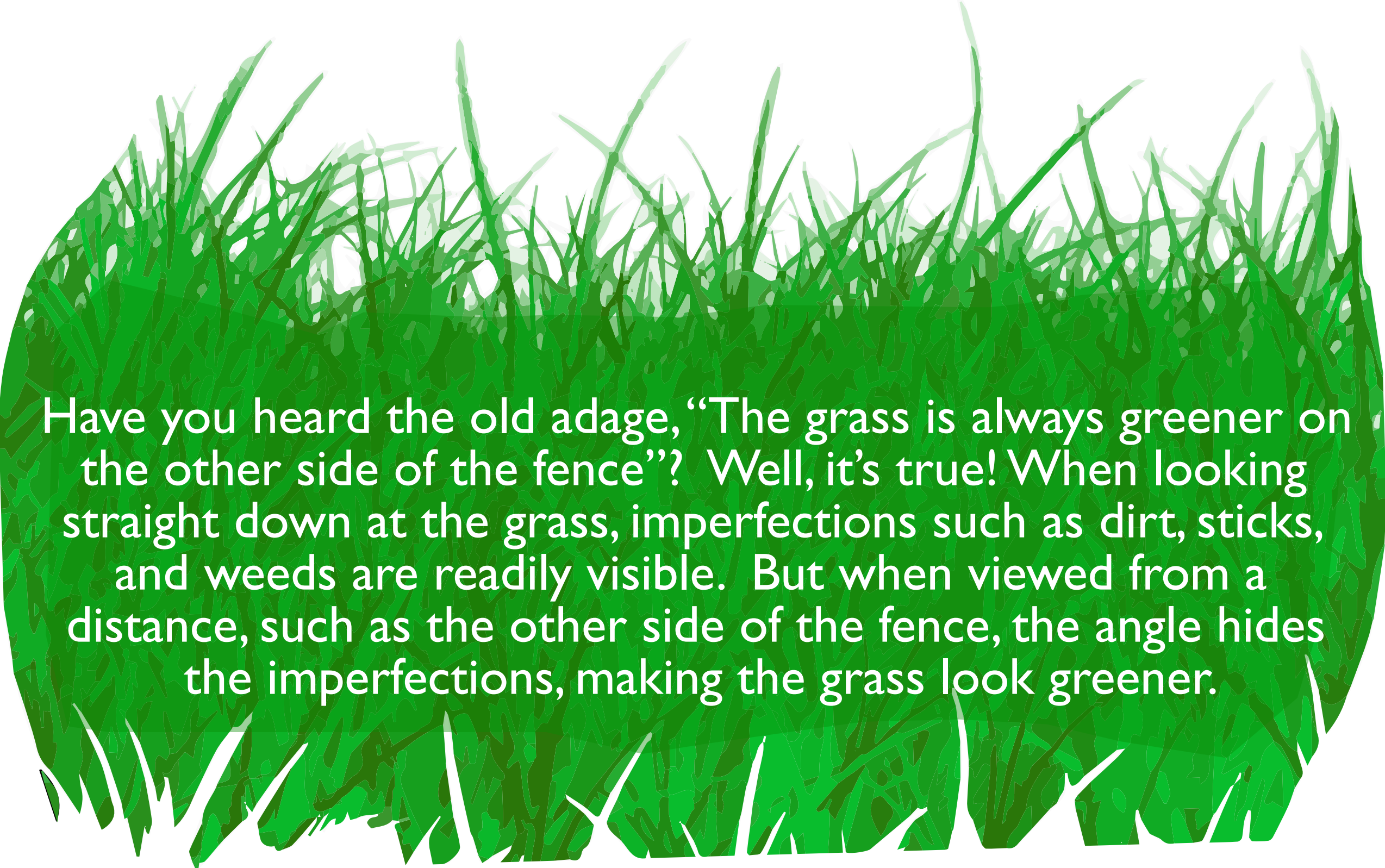
Contrary to popular belief, chameleons do not change color in order to camouflage themselves. They use their amazing color-changing abilities to help regulate body temperature and to communicate with other chameleons. Several layers of their skin are filled with sacks of different pigments, which can open and close in a wide array of combinations.

Eating leafy greens is a great way to improve your health. Greens such as chard and kale are nutrient dense - packed full of fiber, vitamins, minerals, and antioxidants. Eating plenty of green vegetables can help prevent cancer and diabetes, maintain a healthy blood pressure, promote stronger bones and teeth, and protect eye health.



Many animals use color as a defense. Green tree frogs (*Hyla cinerea*) use their color to help them hide from predators. Using three types of pigment cells, the frogs are able to change their color to more yellow or gray depending on their back drop.






Have you heard the old adage, “The grass is always greener on the other side of the fence”? Well, it’s true! When looking straight down at the grass, imperfections such as dirt, sticks, and weeds are readily visible. But when viewed from a distance, such as the other side of the fence, the angle hides the imperfections, making the grass look greener.



Green is a healing color,  
alleviating anxiety and depression.

Research shows that access to green space  
benefits our health in many ways. Even just  
enjoying a view of nature can reduce blood  
pressure, heart rate, muscle tension and  
the production of stress hormones.

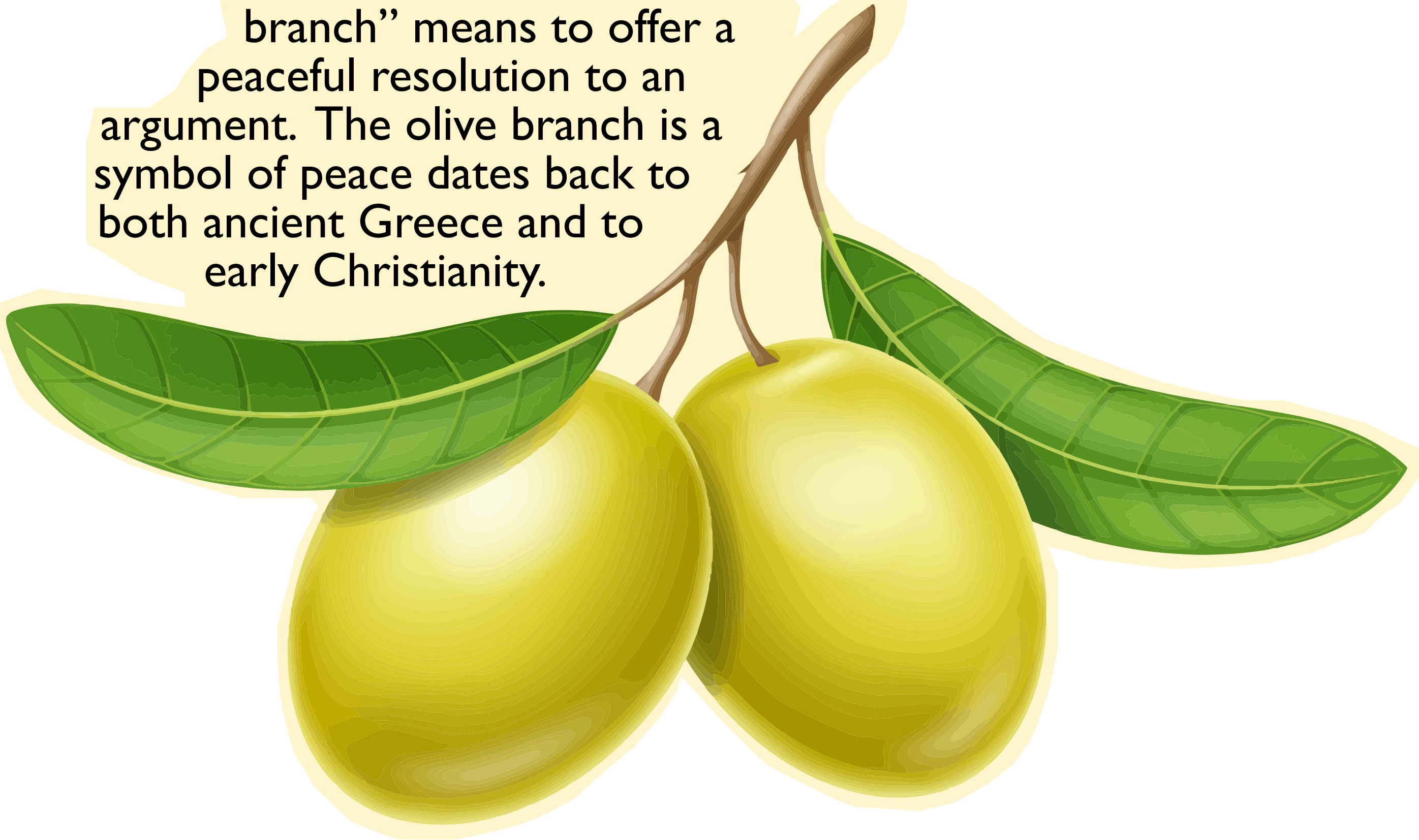
A large, vibrant green leaf with a prominent central vein and several lateral veins. The leaf has a slightly wavy, pointed edge and a short stem extending from the bottom left. It is set against a plain white background.


The green color in plants comes from chlorophyll, the most abundant and important pigment on Earth. It provides us with the oxygen we breathe and the food we eat. Chlorophyll makes it possible for plants to turn light energy into food. It is the basis for our entire food web.

Green fruits are nutrition powerhouses! Green kiwis are higher in potassium than bananas and are loaded with vitamins E, C, and K, copper, fiber and antioxidants. Fresh limes are packed with Vitamin C and healthy omega-3 fatty acids.



To “offer an olive branch” means to offer a peaceful resolution to an argument. The olive branch is a symbol of peace dates back to both ancient Greece and to early Christianity.



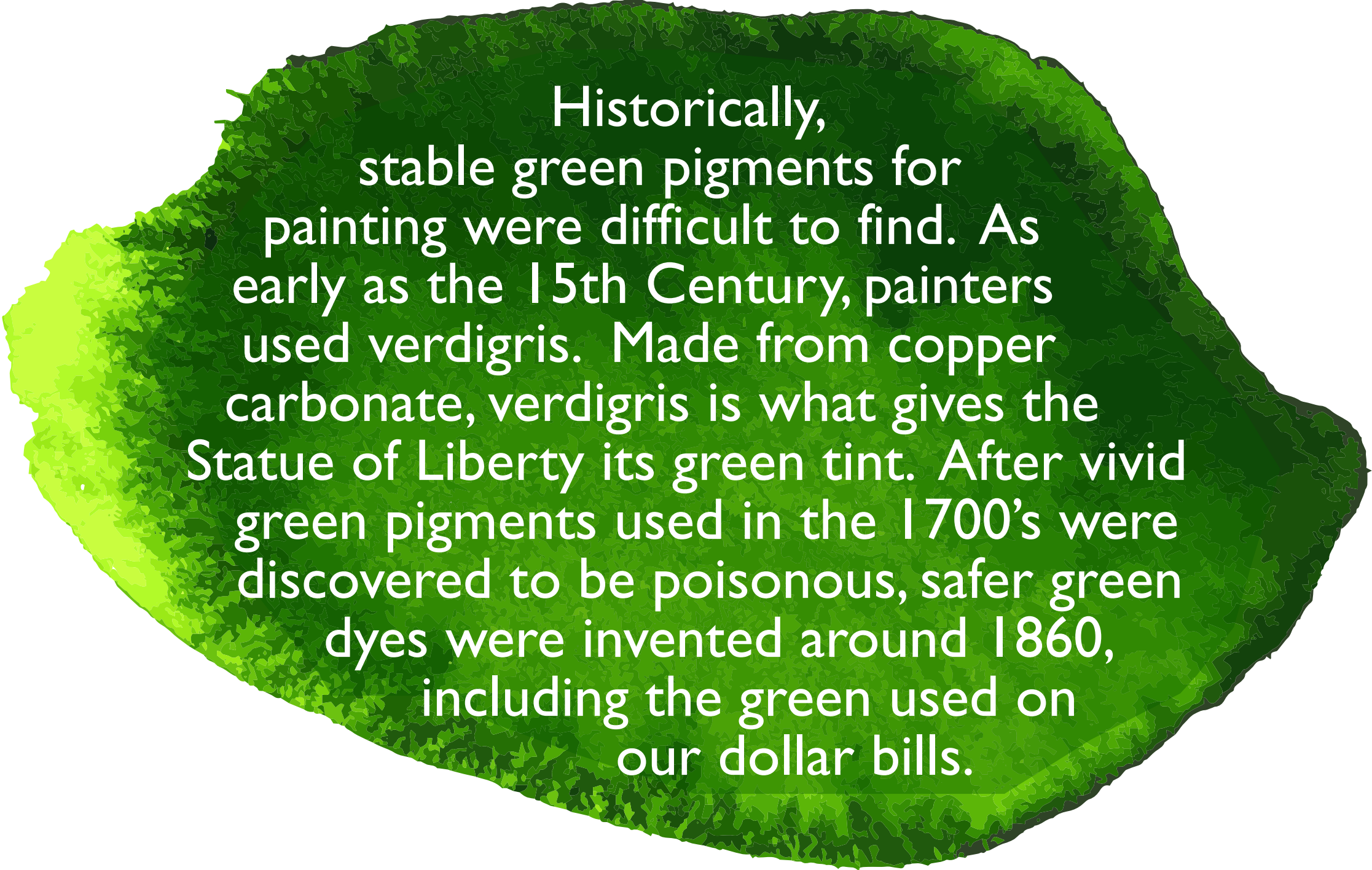


“Green is the  
essence of life.”  
“Life on our planet  
is, quite literally,  
green-dependent.”  
All animals on  
Earth rely on  
green plants to  
produce the  
oxygen we  
breathe  
and the  
food  
we  
eat.

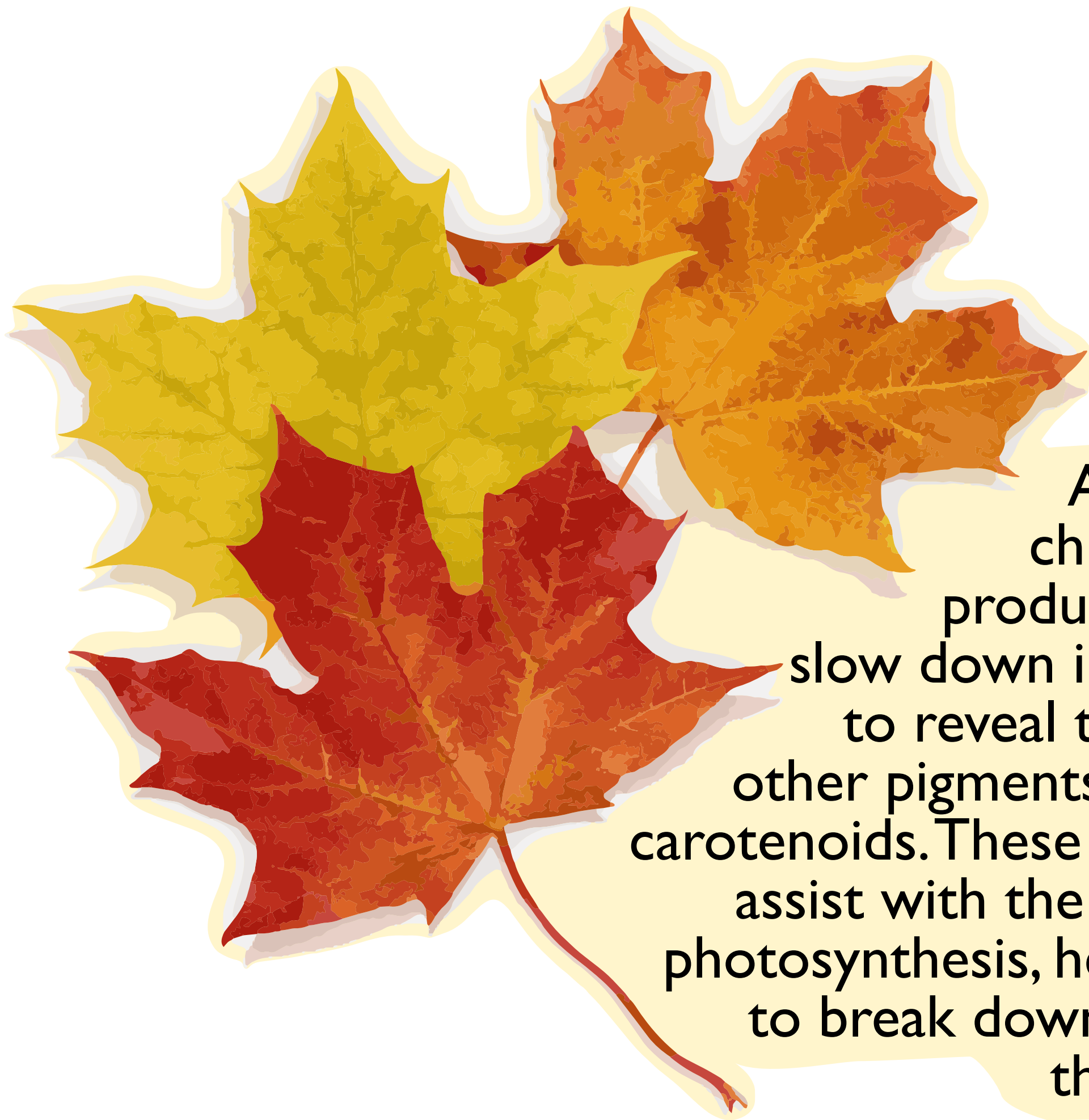
Read more in the book THE SECRET LANGUAGE OF COLOR. Copyright © 2013 by Joann and Arielle Eckstut. Reprinted by permission of Black Dog & Leventhal Publishers.



Around the world, green is a symbol of hope, rebirth, and regeneration. Most Western cultures view green as the color of luck and prosperity, famously represented by Ireland's lucky shamrock.



Historically,  
stable green pigments for  
painting were difficult to find. As  
early as the 15th Century, painters  
used verdigris. Made from copper  
carbonate, verdigris is what gives the  
Statue of Liberty its green tint. After vivid  
green pigments used in the 1700's were  
discovered to be poisonous, safer green  
dyes were invented around 1860,  
including the green used on  
our dollar bills.



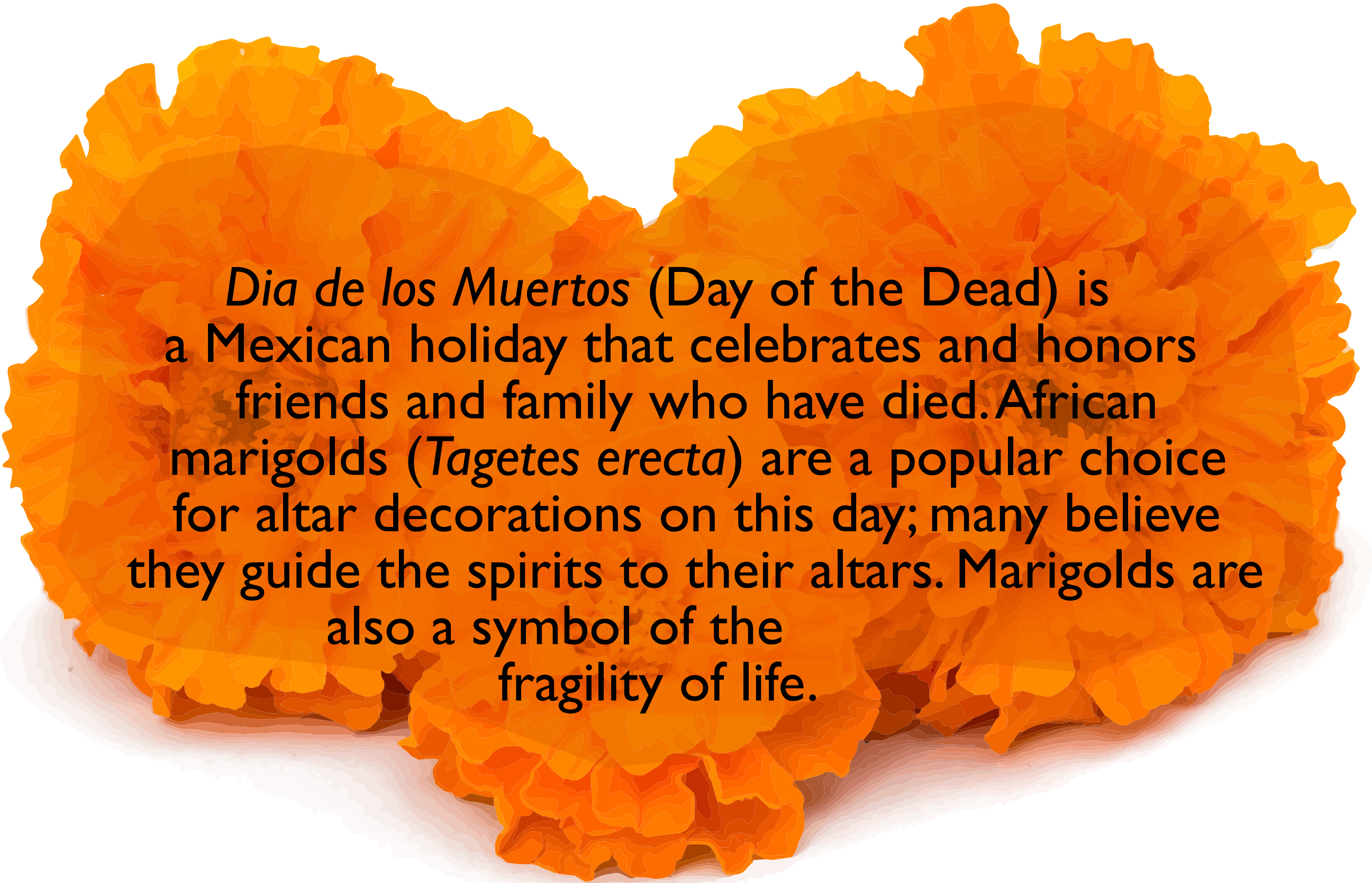
As green chlorophyll production starts to slow down in the fall, it fades to reveal the presence of other pigments, such as orange carotenoids. These orange pigments assist with the process of photosynthesis, helping the plant to break down energy from the sun.

Prior to domestication, wild carrot roots grew in shades of red, yellow, white, and, most often, purple. Approximately 400 years ago, carrots were cultivated to favor the orange shade we are most familiar with today.





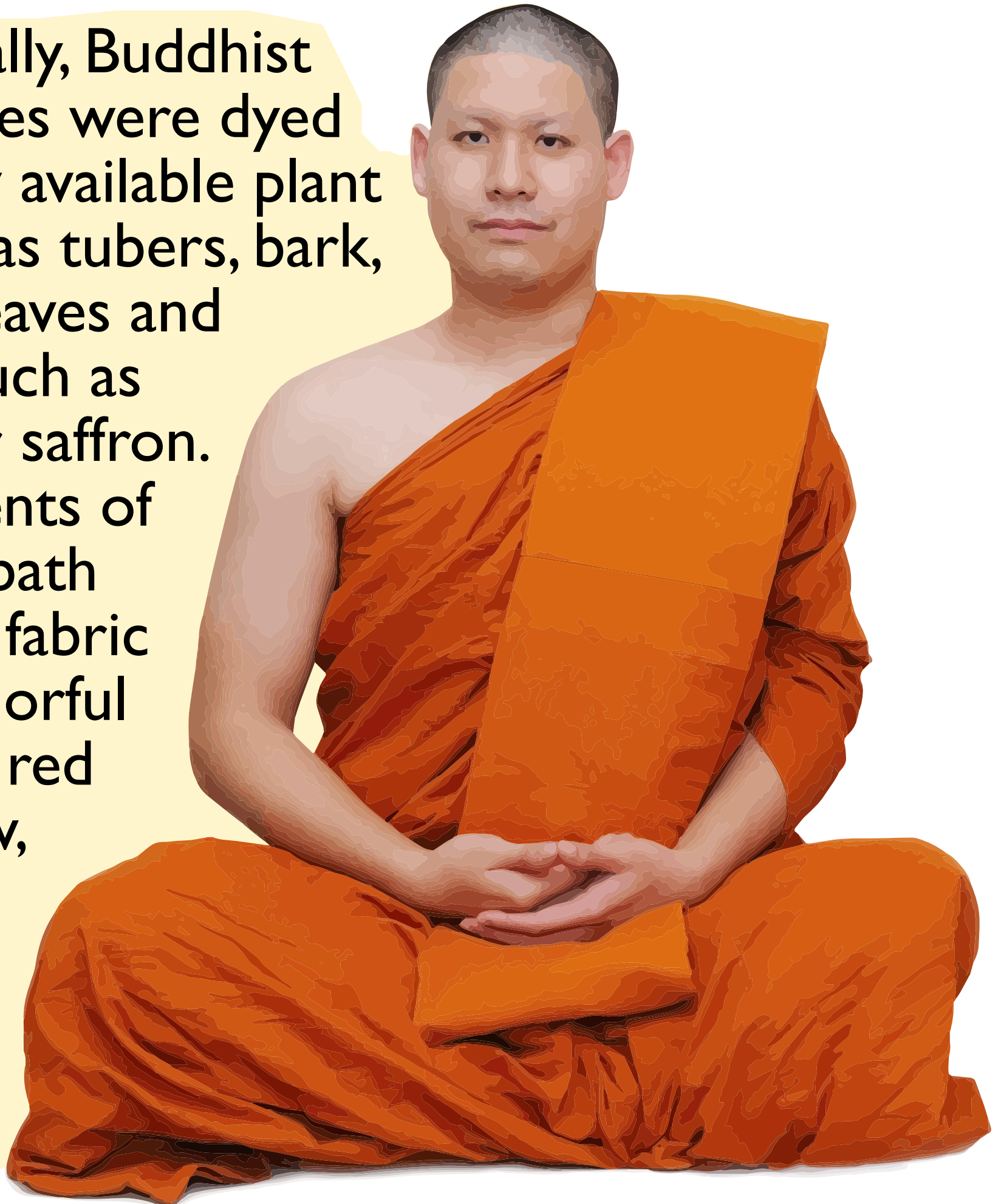
The color  
orange was named  
after the popular fruit.  
Oranges are full of vitamins,  
minerals, and good-for-you  
fiber. Eating whole oranges  
provides more health  
benefits than drinking the  
juice alone.



*Dia de los Muertos* (Day of the Dead) is a Mexican holiday that celebrates and honors friends and family who have died. African marigolds (*Tagetes erecta*) are a popular choice for altar decorations on this day; many believe they guide the spirits to their altars. Marigolds are also a symbol of the fragility of life.

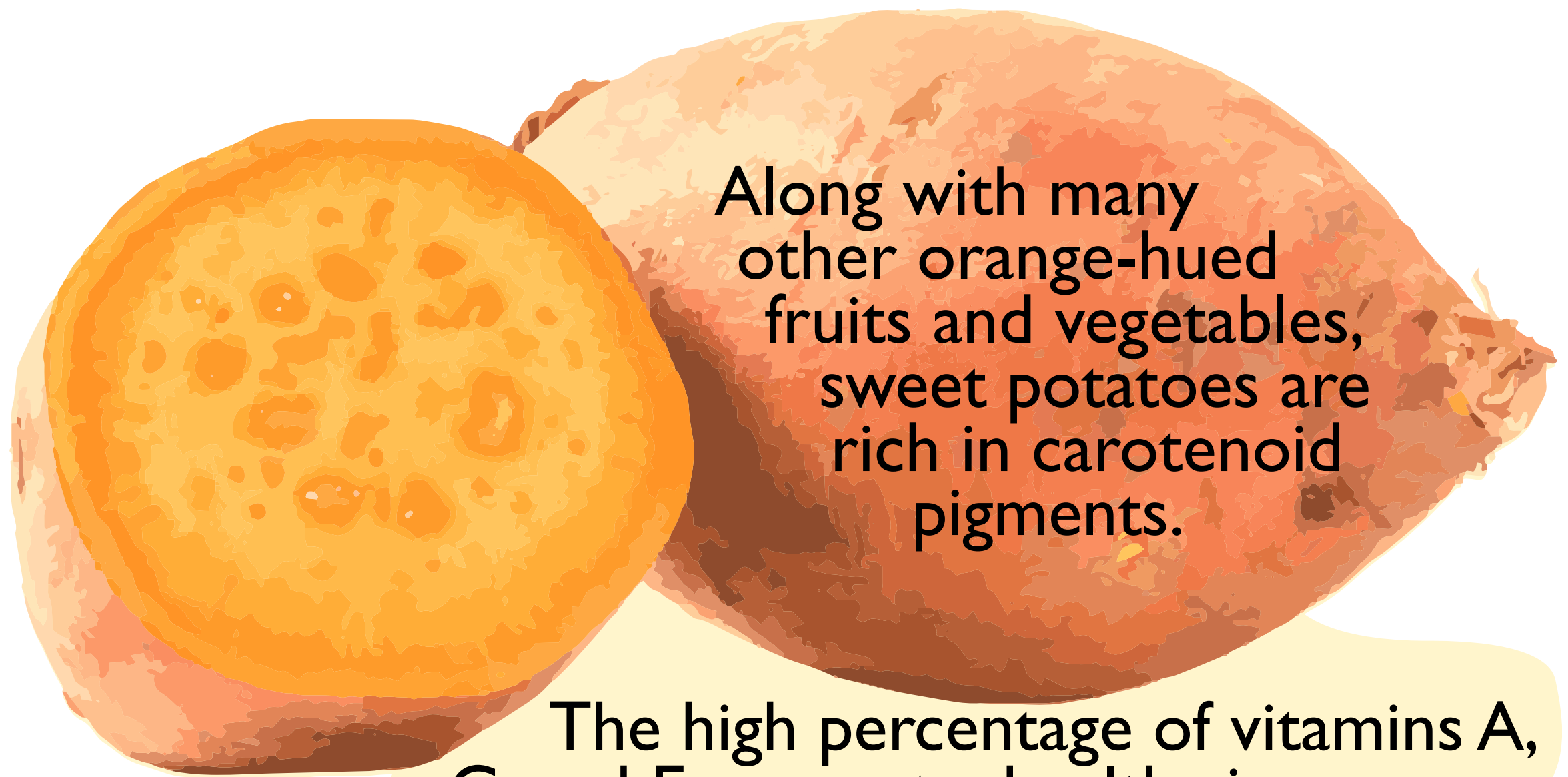
Historically, Buddhist monk robes were dyed with readily available plant parts such as tubers, bark, flowers, leaves and spices such as turmeric or saffron.

The contents of the dye bath caused the fabric to turn colorful shades of red and yellow, which combined to form the color orange.





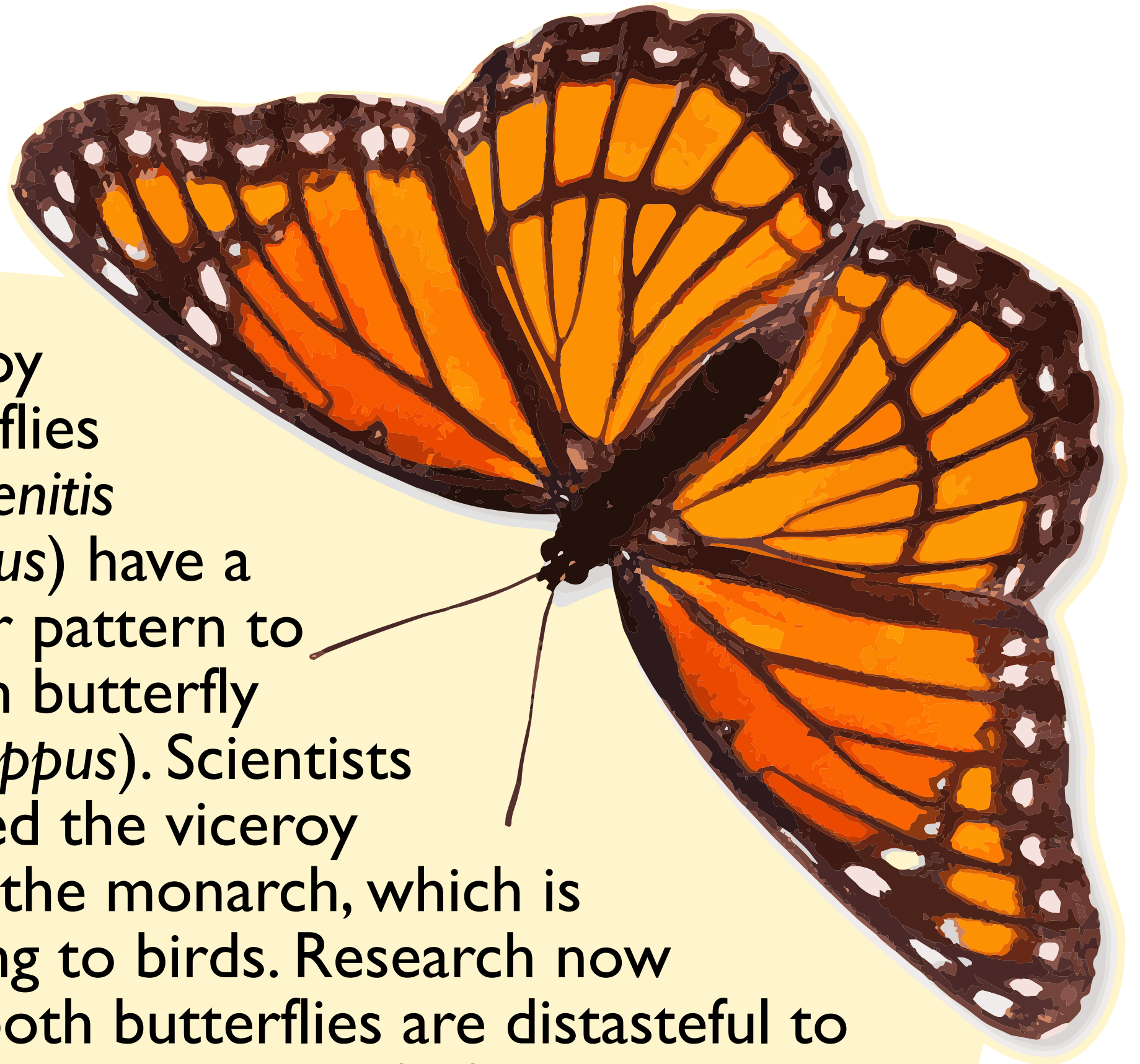
The Baltimore Oriole (*Icterus galbula*), a songbird widespread in the east, received its name from its bold orange and black plumage. They sport the same colors as the coat-of-arms of Lord Baltimore, recognized for establishing the colony of Maryland.

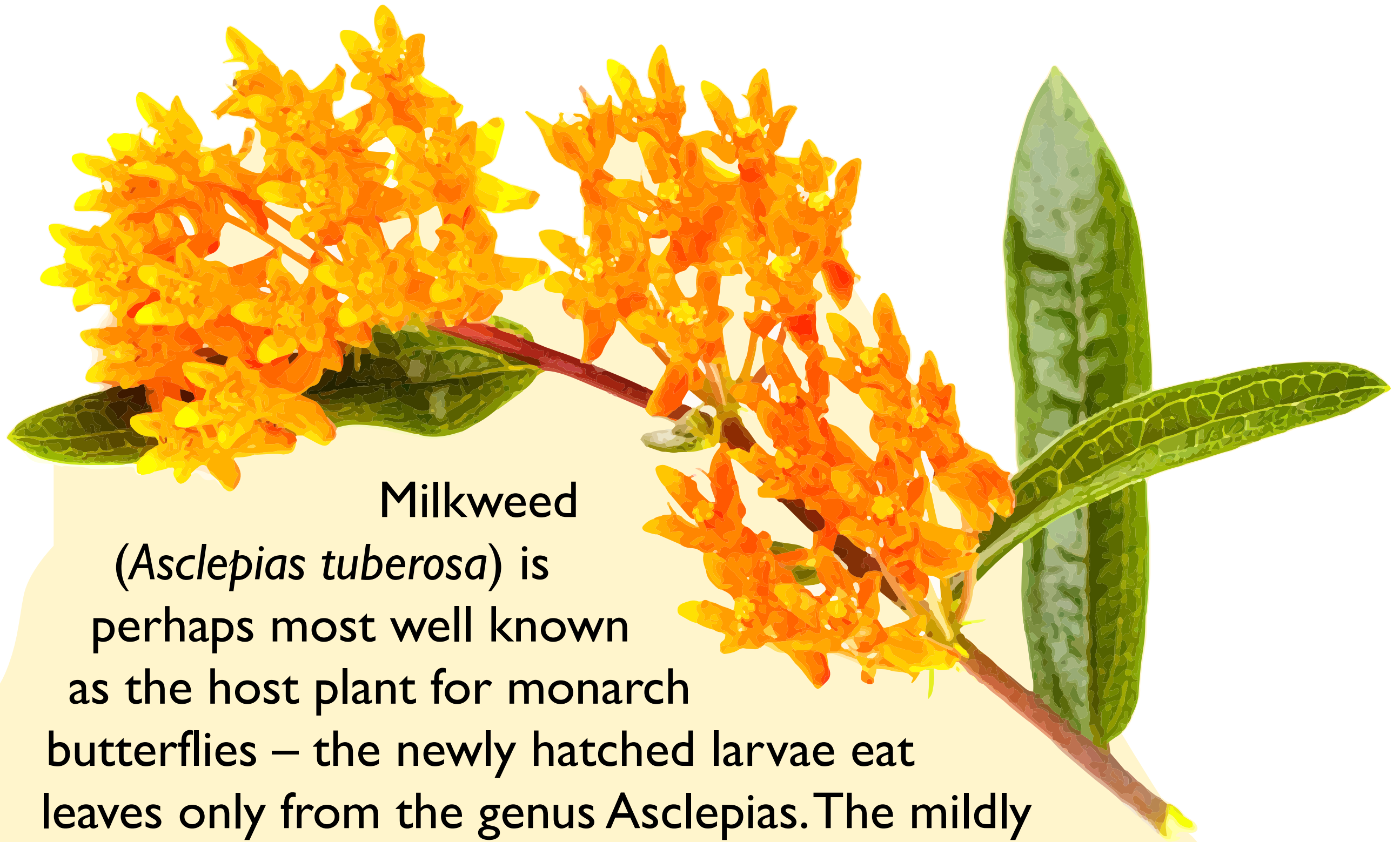


Along with many other orange-hued fruits and vegetables, sweet potatoes are rich in carotenoid pigments.

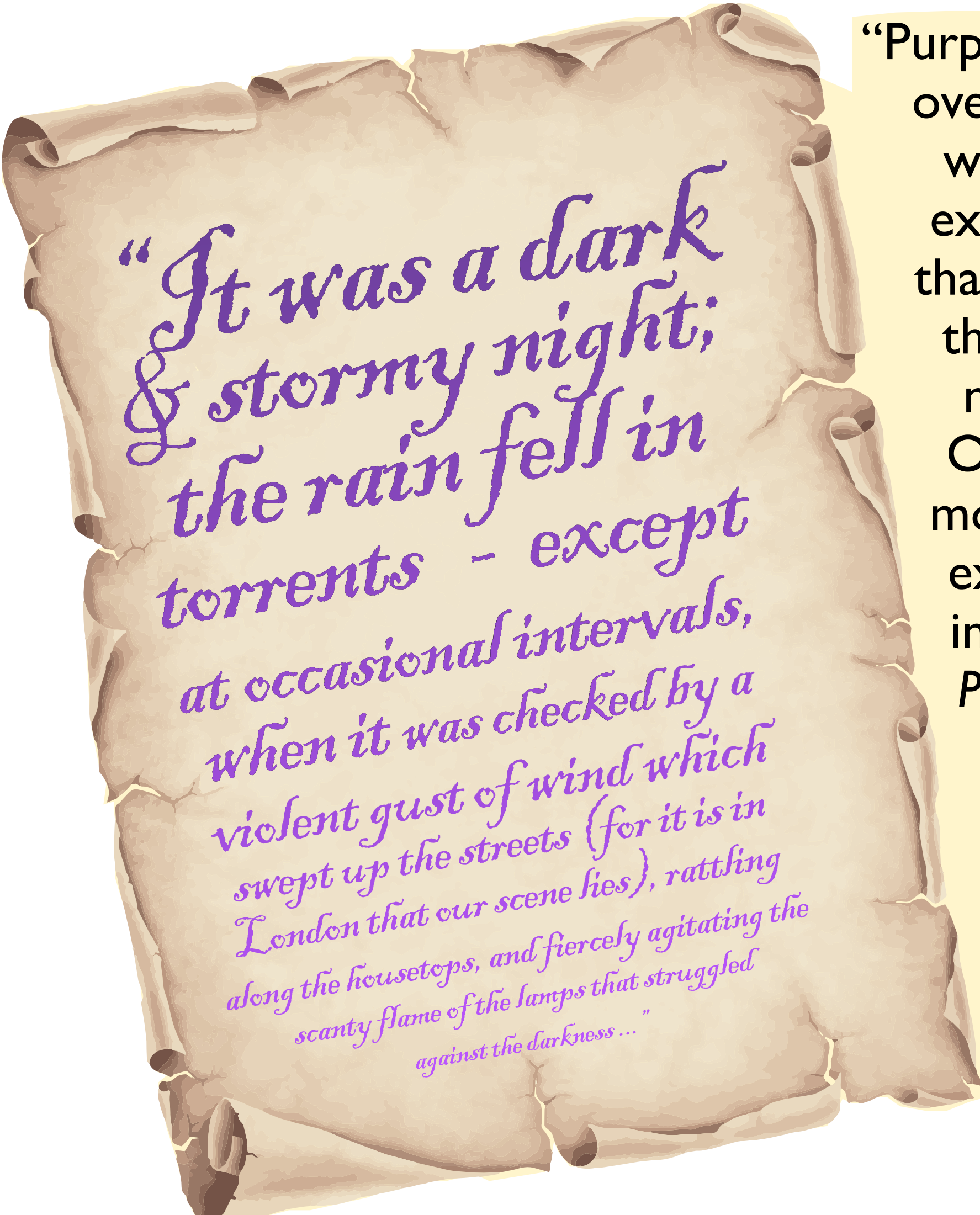
The high percentage of vitamins A, C, and E support a healthy immune system and may help protect against sun damage.

Viceroy butterflies (*Limenitis archippus*) have a similar color pattern to the monarch butterfly (*Danaus plexippus*). Scientists once believed the viceroy mimicked the monarch, which is unappetizing to birds. Research now reveals that both butterflies are distasteful to birds - they both benefit from looking like the other.






Milkweed  
(*Asclepias tuberosa*) is  
perhaps most well known  
as the host plant for monarch  
butterflies – the newly hatched larvae eat  
leaves only from the genus *Asclepias*. The mildly  
toxic chemical compounds in the leaves make the  
caterpillars distasteful to birds, protecting them  
from predators.

A piece of aged, torn parchment with a yellowish-brown hue and irregular, ragged edges. The parchment is slightly wrinkled and has some darker staining, particularly along the left edge. The text is written in a vibrant purple color using a highly decorative, flowing cursive script. The text is arranged in a single paragraph that follows the curve of the parchment's shape, starting from the top left and ending at the bottom right. The overall appearance is that of a historical document or a literary manuscript.

*"It was a dark  
& stormy night;  
the rain fell in  
torrents - except  
at occasional intervals,  
when it was checked by a  
violent gust of wind which  
swept up the streets (for it is in  
London that our scene lies), rattling  
along the housetops, and fiercely agitating the  
scanty flame of the lamps that struggled  
against the darkness ..."*

“Purple prose” is over-the-top writing so extravagant that it breaks the flow of narrative. One of the most famous examples is in the book *Paul Clifford* by 19th century English novelist Edward Bulwer Lyton.

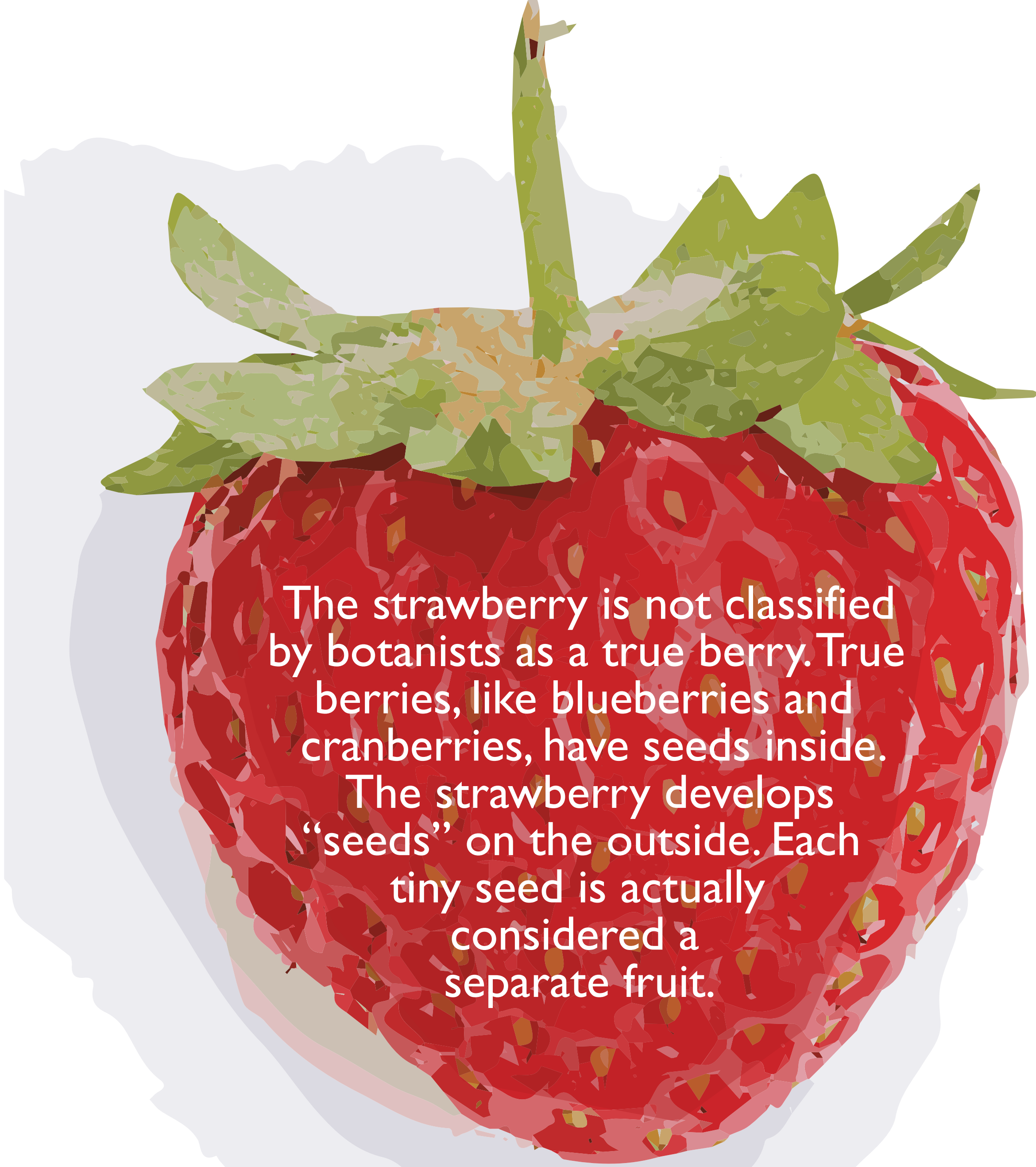


Since the 14th century, purple has been considered a royal color, symbolizing wealth and power. This stemmed from the expensive dye called Tyrian purple. Named after the ancient Middle Eastern city of Tyre, it was made from mollusk shells. It took about 250,000 mollusks to make one ounce of this dye.

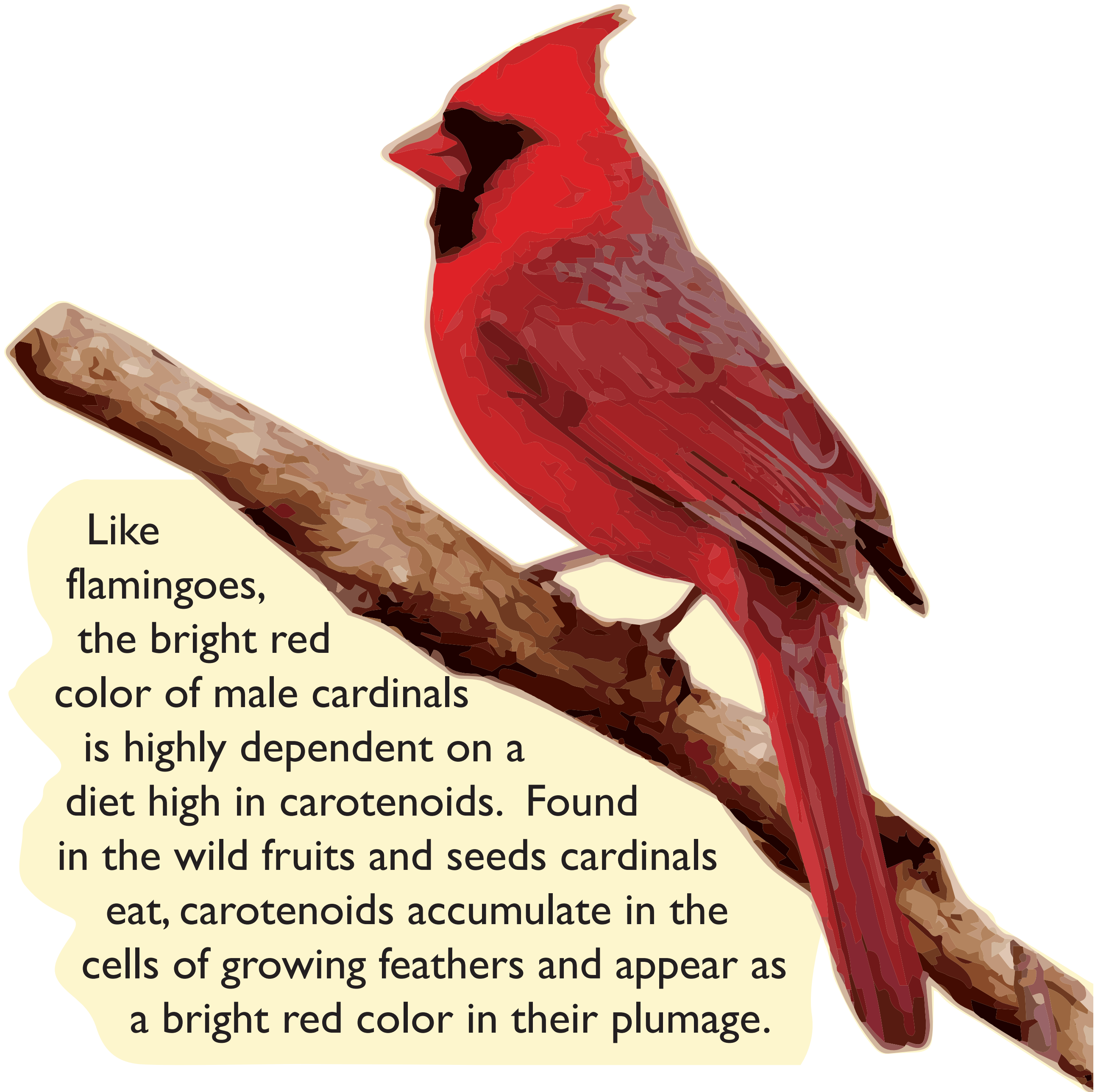
Today, synthetic dyes make it possible for everyone to wear a regal hue!




Violet is its own color in the spectrum, not a combination of red and blue, as we were taught in art classes. The color violet was named after the violet flower. Since Ancient Roman times, violets have been a symbol of love. The common blue violet (*Viola sororia*), found throughout the eastern United States, is an important food source for many of our native butterflies.



The strawberry is not classified by botanists as a true berry. True berries, like blueberries and cranberries, have seeds inside. The strawberry develops “seeds” on the outside. Each tiny seed is actually considered a separate fruit.



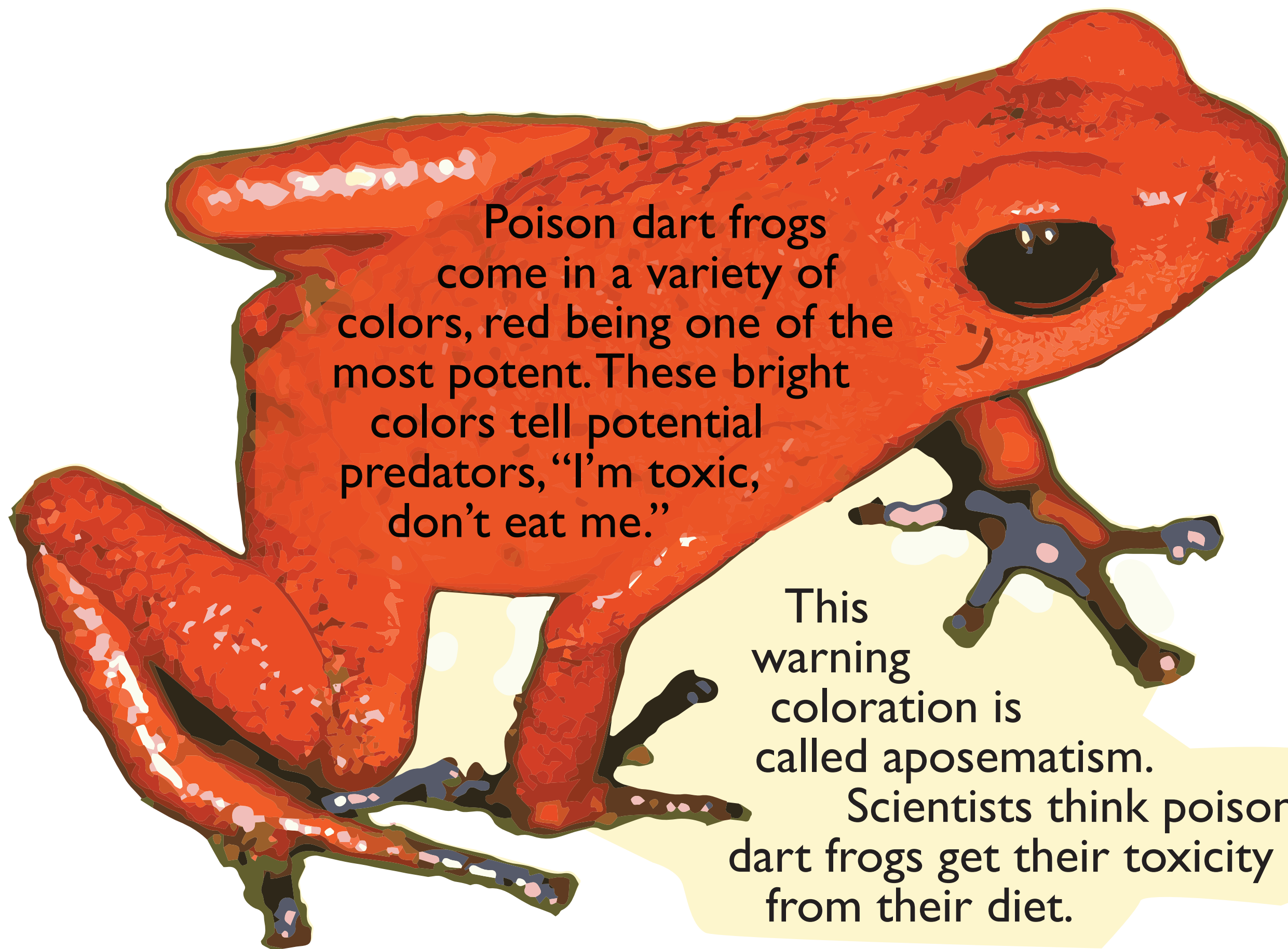
Like flamingoes, the bright red color of male cardinals is highly dependent on a diet high in carotenoids. Found in the wild fruits and seeds cardinals eat, carotenoids accumulate in the cells of growing feathers and appear as a bright red color in their plumage.



Flamingos aren't  
born pink. Their diet of  
brine shrimp and  
blue-green algae, both high  
in carotenoid pigments,  
turns their grey  
feathers pink.



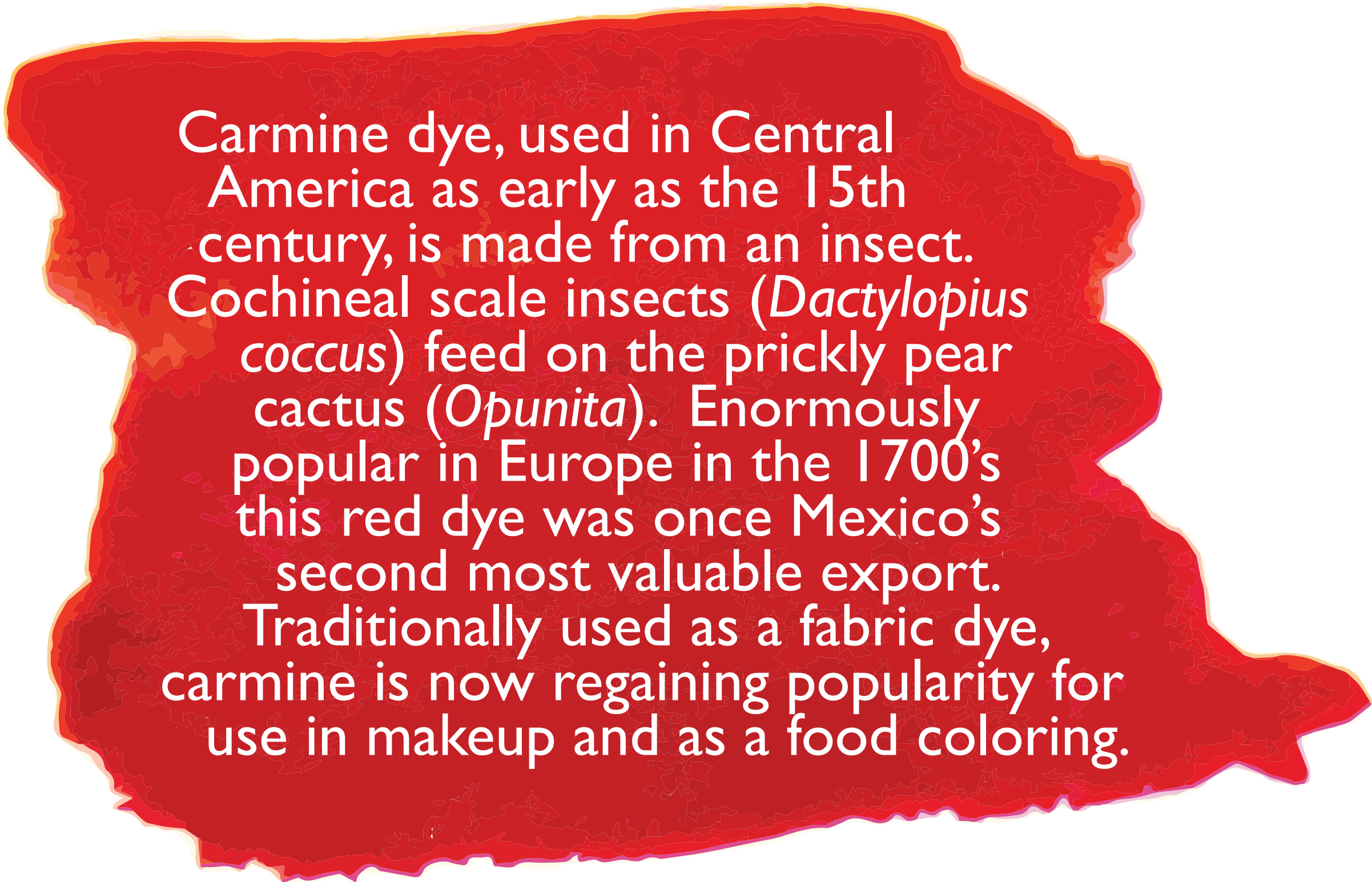
Many cultures around the world consider red the color of love and romance. While white is the color Western cultures most associate with weddings, brides in India, China, and Vietnam wear red for their nuptials, symbolizing good fortune.




Poison dart frogs come in a variety of colors, red being one of the most potent. These bright colors tell potential predators, “I’m toxic, don’t eat me.”

This warning coloration is called aposematism.

Scientists think poison dart frogs get their toxicity from their diet.



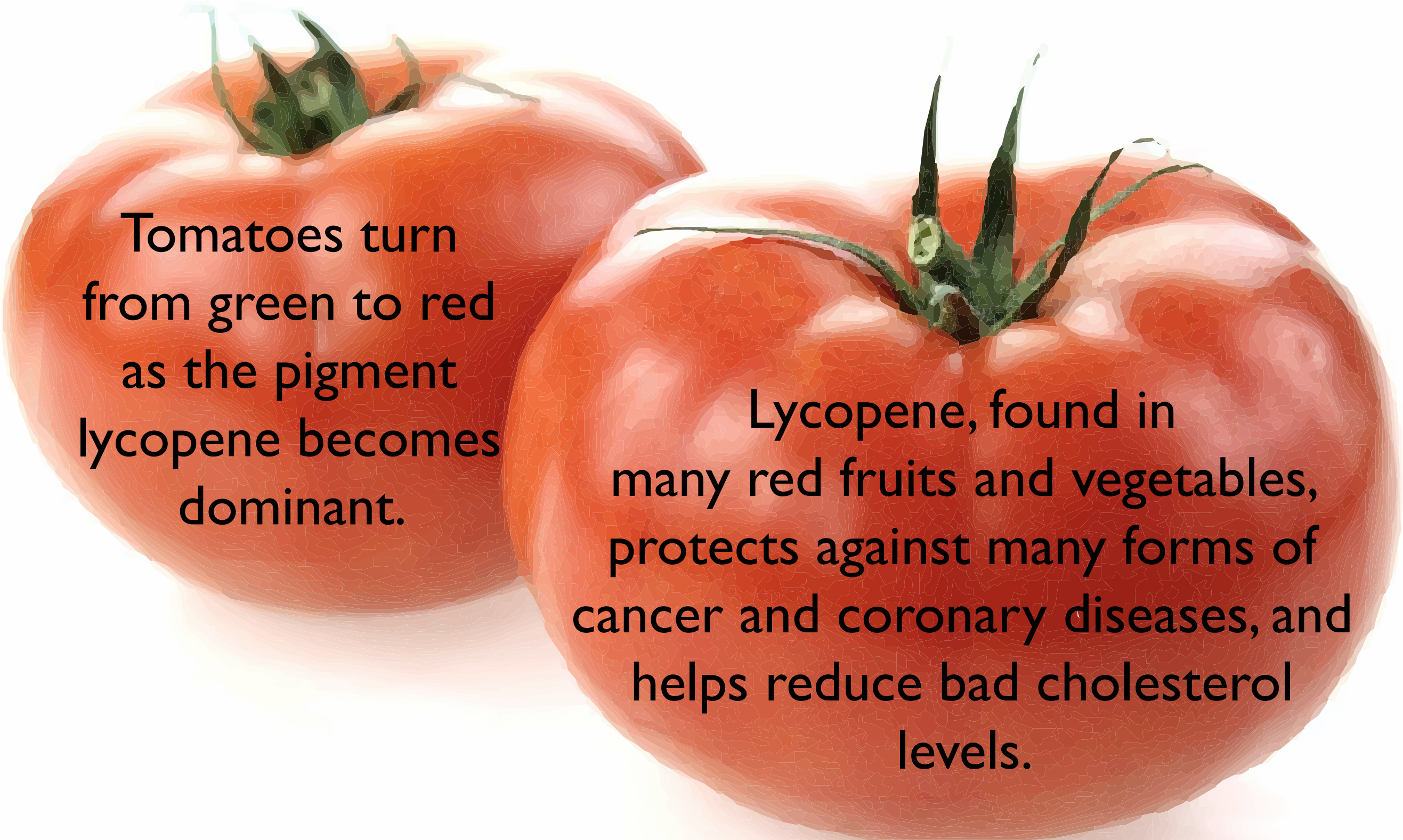
Carmine dye, used in Central America as early as the 15th century, is made from an insect. Cochineal scale insects (*Dactylopius coccus*) feed on the prickly pear cactus (*Opuntia*). Enormously popular in Europe in the 1700's this red dye was once Mexico's second most valuable export. Traditionally used as a fabric dye, carmine is now regaining popularity for use in makeup and as a food coloring.



Mars is called the “Red Planet” because of the reddish color of its surface, caused by abundance of iron oxide. Iron oxide is also what makes rust, blood, and some clays reddish in color.



It takes about 2,000 flowers to produce one gram of rose oil, roughly  $\frac{1}{4}$  of a teaspoon. The distillation technique used to produce rose oil originated in ancient Persia then spread through Arabia and India.


Two ripe red tomatoes with green stems are shown against a white background. The tomato on the left is slightly behind the one on the right. Both tomatoes are round and have a smooth, slightly bumpy texture. The green stems are attached to the top of each tomato.

Tomatoes turn  
from green to red  
as the pigment  
lycopene becomes  
dominant.

Lycopene, found in  
many red fruits and vegetables,  
protects against many forms of  
cancer and coronary diseases, and  
helps reduce bad cholesterol  
levels.

While most people are familiar with the European Honey Bee, there are over 4,000 different species of native bees in North America including the Mason, Bumble, and Carpenter bees. Our native Blueberry Bee evolved along with our native blueberry bushes and is an important pollinator for this popular fruit.





Why so many yellow  
and violet flowers in early  
spring? Bees see a different  
range of the color spectrum than  
we do. Violet and yellow are two  
colors they see best. Early spring  
blooms in shades of violet and  
yellow act as beacons to bees  
as they establish their  
flight paths.



A European native brought to America by the British as an important winter food crop and medicinal herb, Dandelions (*Taraxacum officinale*) can provide for pollinators and people year round. Dandelion greens provide four times the calcium, 1.5 times the vitamin A and 7.5 times the vitamin K as broccoli. Blowing the seed heads of a Dandelion is even thought to make wishes come true.



Only domestically bred white ducks have bright yellow chicks. In nature, baby ducks have markings that help them stay hidden within the brown foliage of watergrasses that surround early spring lakes and streams.

An egg yolk's color is determined solely by the diet of the chicken. White corn results in pale, almost colorless, yolks. The carotenoids found in yellow corn, alfalfa, and carrots create deep orange yolks.



Commonly known as the African Marigold, *Tagetes erecta* is actually native to Mexico and South America. For thousands of years marigolds have been used to create beautiful plant dyes and are also used in medicinal remedies for a range of ailments.





Prized  
for their  
oil, sunflowers  
are one of the few major agricultural  
crops native to North America. Their  
pollen provides food for native  
pollinators. The resulting seeds, rich in  
vital minerals and nutrients feed wildlife  
as well as people.

Bananas are packed with vitamins and nutrients, including the carotenoid lutein, which gives them their yellow color. The dark spots seen in ripe or overripe bananas result from the pigment melanin. Melanin is also the most common pigment in animals, coloring our skin, hair, and eyes.

