Our eyes cannot see a wide area all at once, but they quickly scan the surroundings and send the information to the macula. The macula is where light focuses, so it has many photoreceptor cells. Our brain uses the information from the macula to see the world more clearly and accurately.

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K7.1.3 The Way Our Brain Perceives Colors

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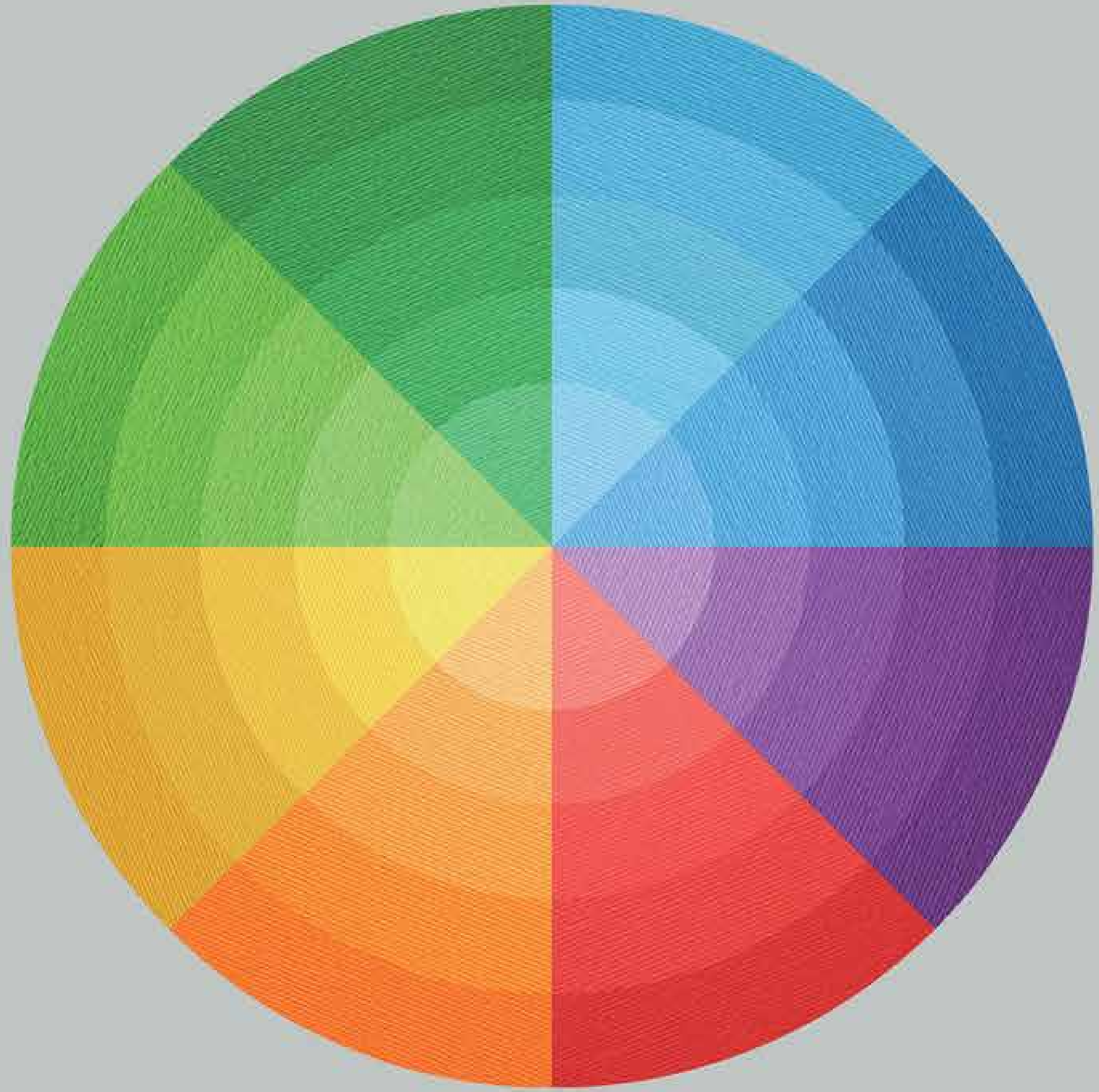
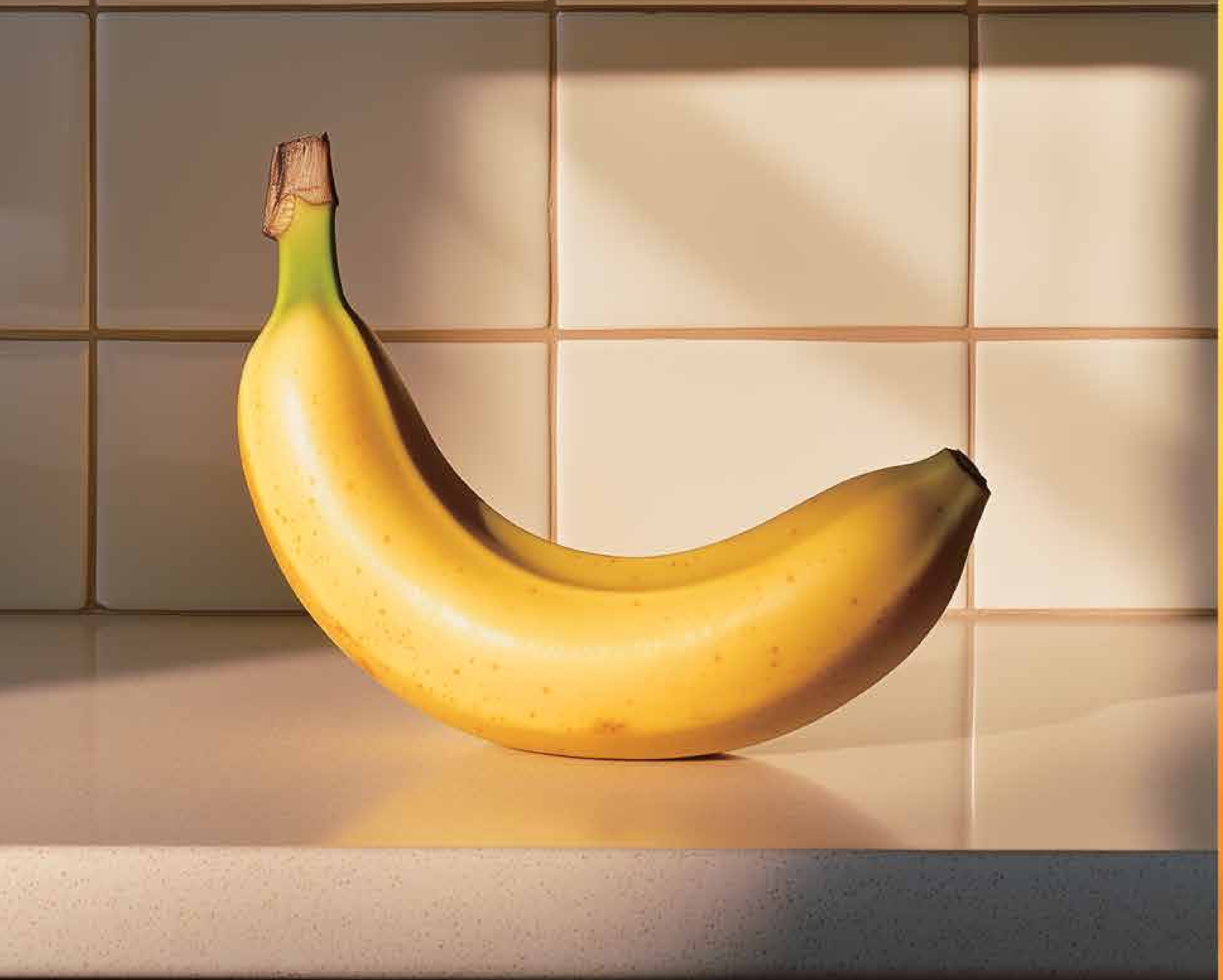
What happens if light with a certain color stimulates all three types of cone cells at the same time?

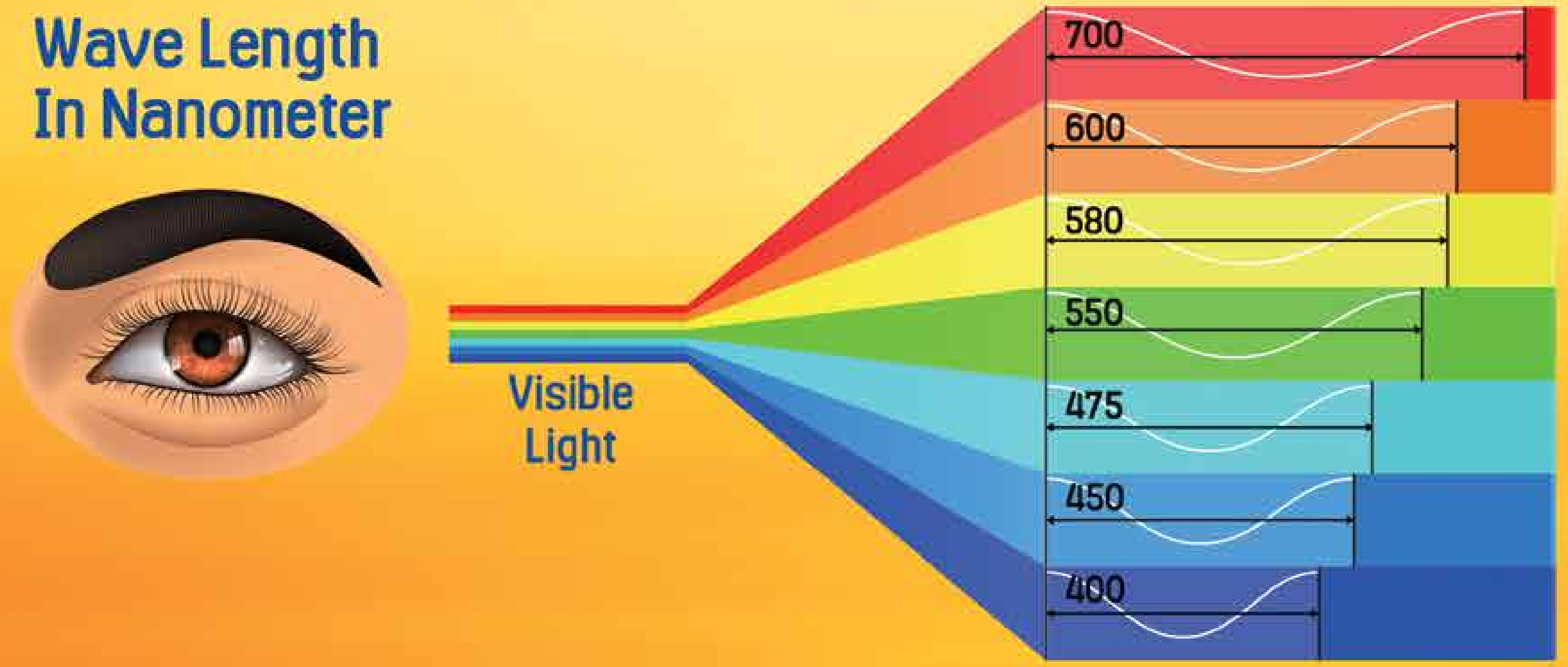
The different cone cells help us see a wide range of colors. But there is a catch.



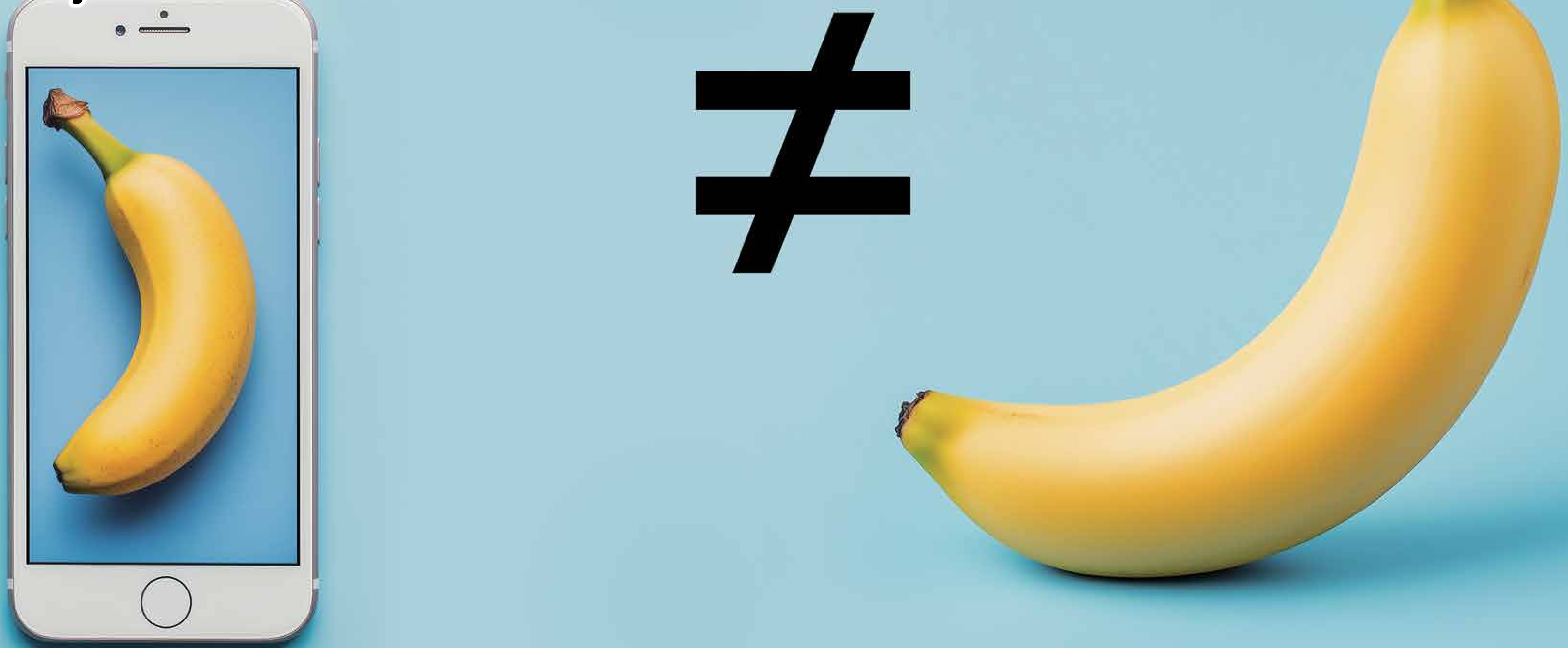
Imagine we are looking at a yellow banana in the kitchen.



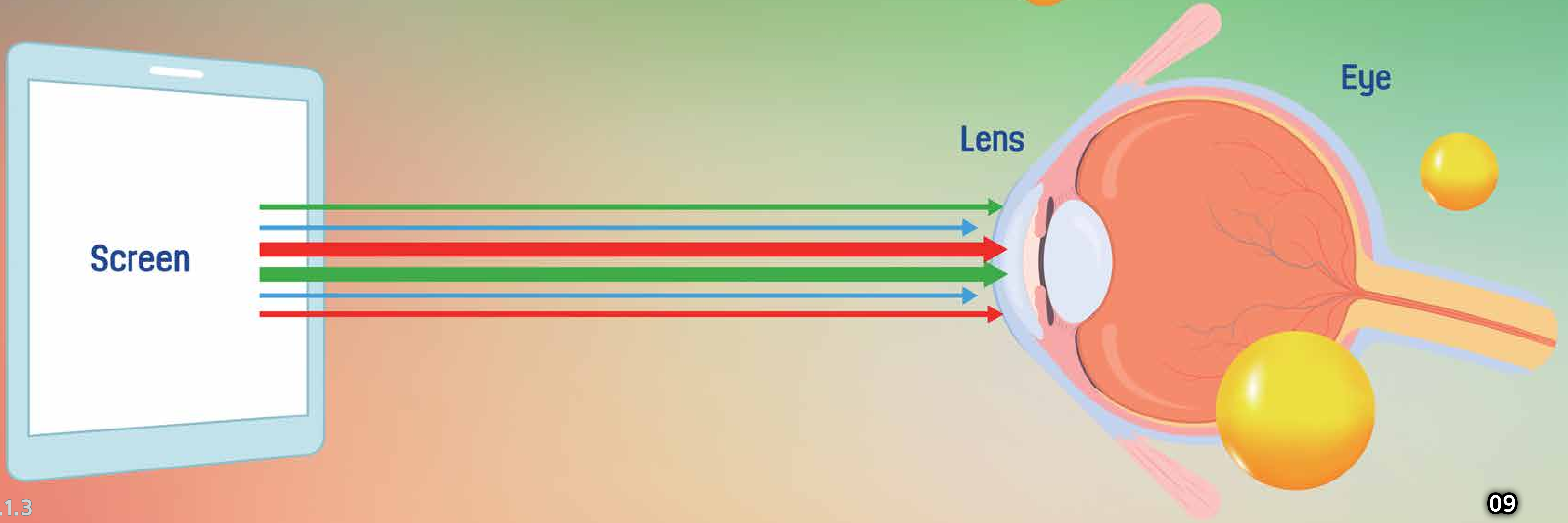
The banana appears yellow to our eyes because the light with a wavelength of approximately 580 nanometers, corresponding to the color yellow, enters our eyes.



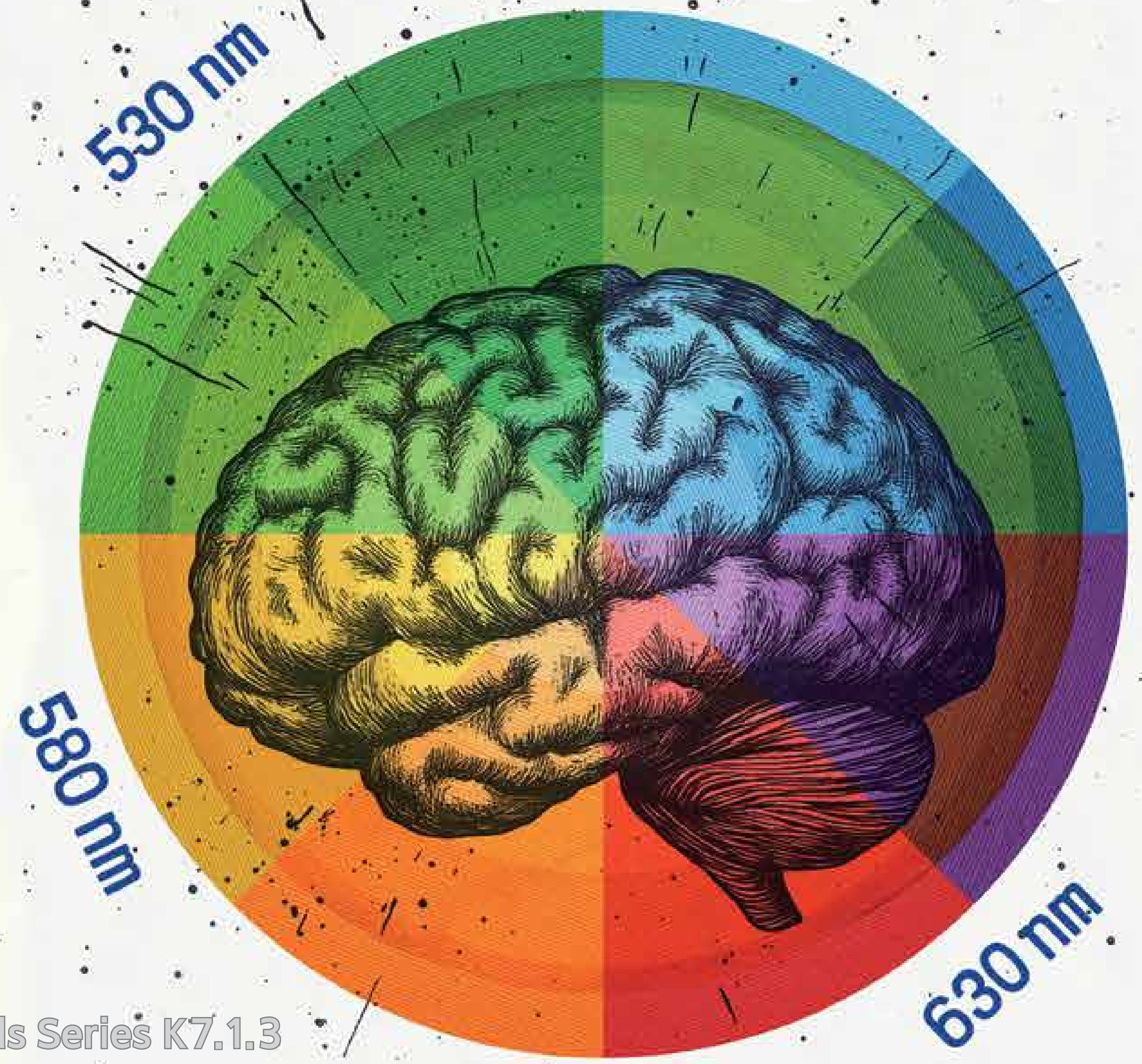
However, the yellow wavelength of a banana seen on a smartphone is different from the wavelength of a real yellow banana.



On a smartphone, the yellow color of the banana is made up of red light, around 630 nanometers, and green light, around 530 nanometers. These two colors blend in a way that tricks our eyes into seeing yellow.



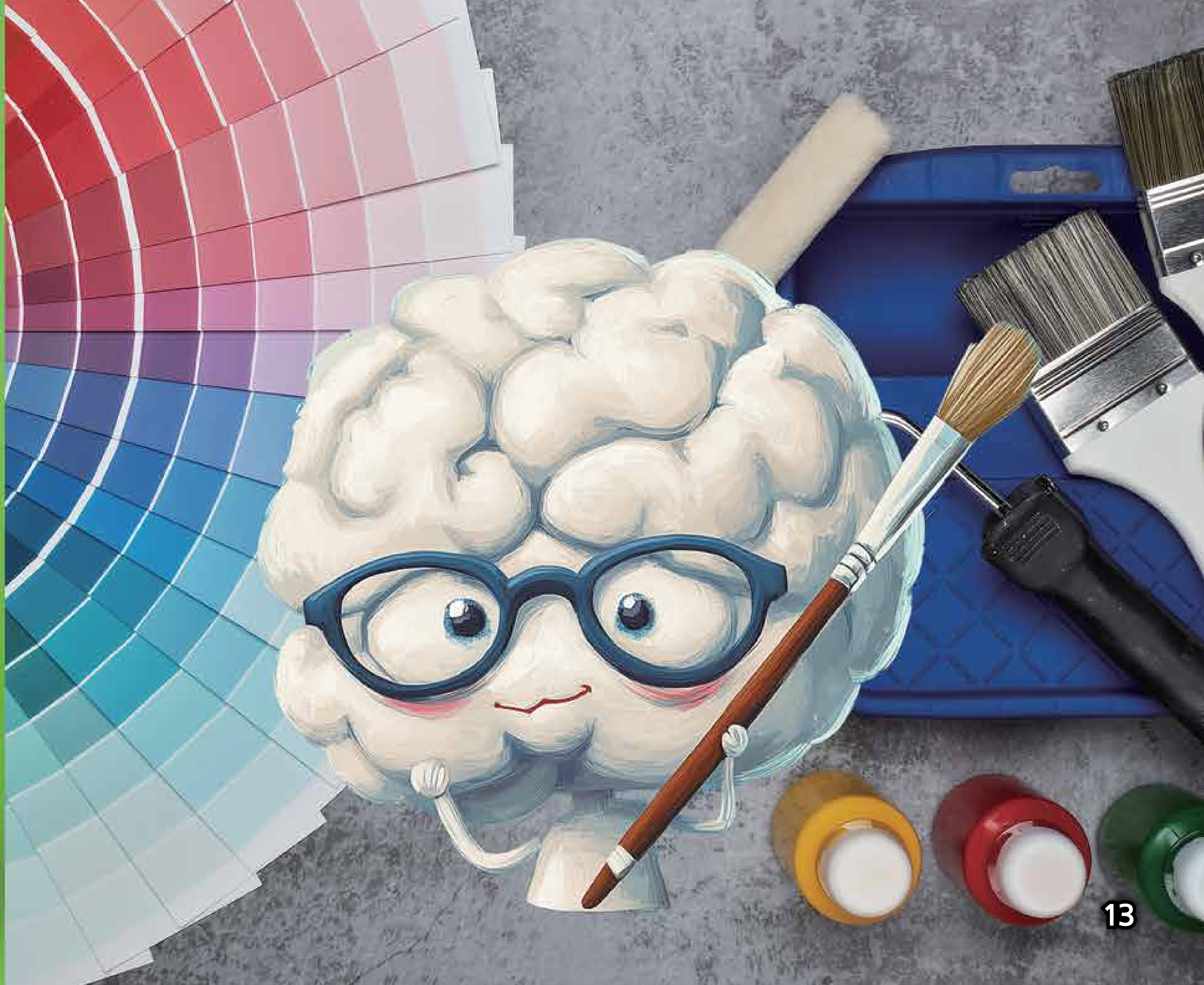
When cone cells simultaneously transmit signals of a red wavelength of 630 nm and a green wavelength of 530 nm to the brain, the brain makes the illusion that yellow light of 580 nm is entering our eyes.



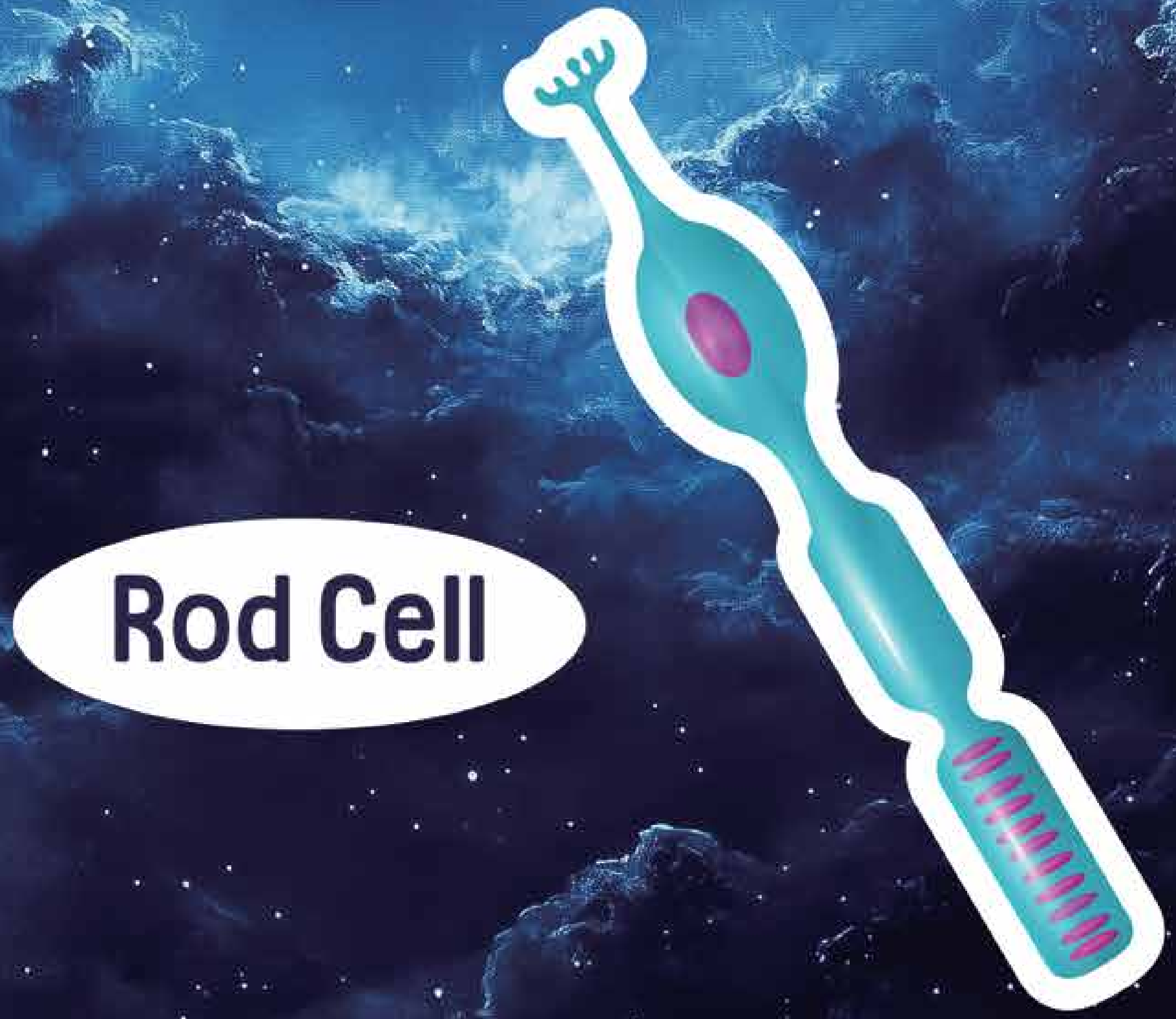
So, the banana we see on smartphones is not really yellow.

The many colors we see on TV also use this trick to make our brains perceive colors in a special way.

In this way, our brains often interpret colors differently from what they really are.



Rod cells become more important at night when there is very little light. Rod cells are stick-shaped cells located away from the center of the retina.



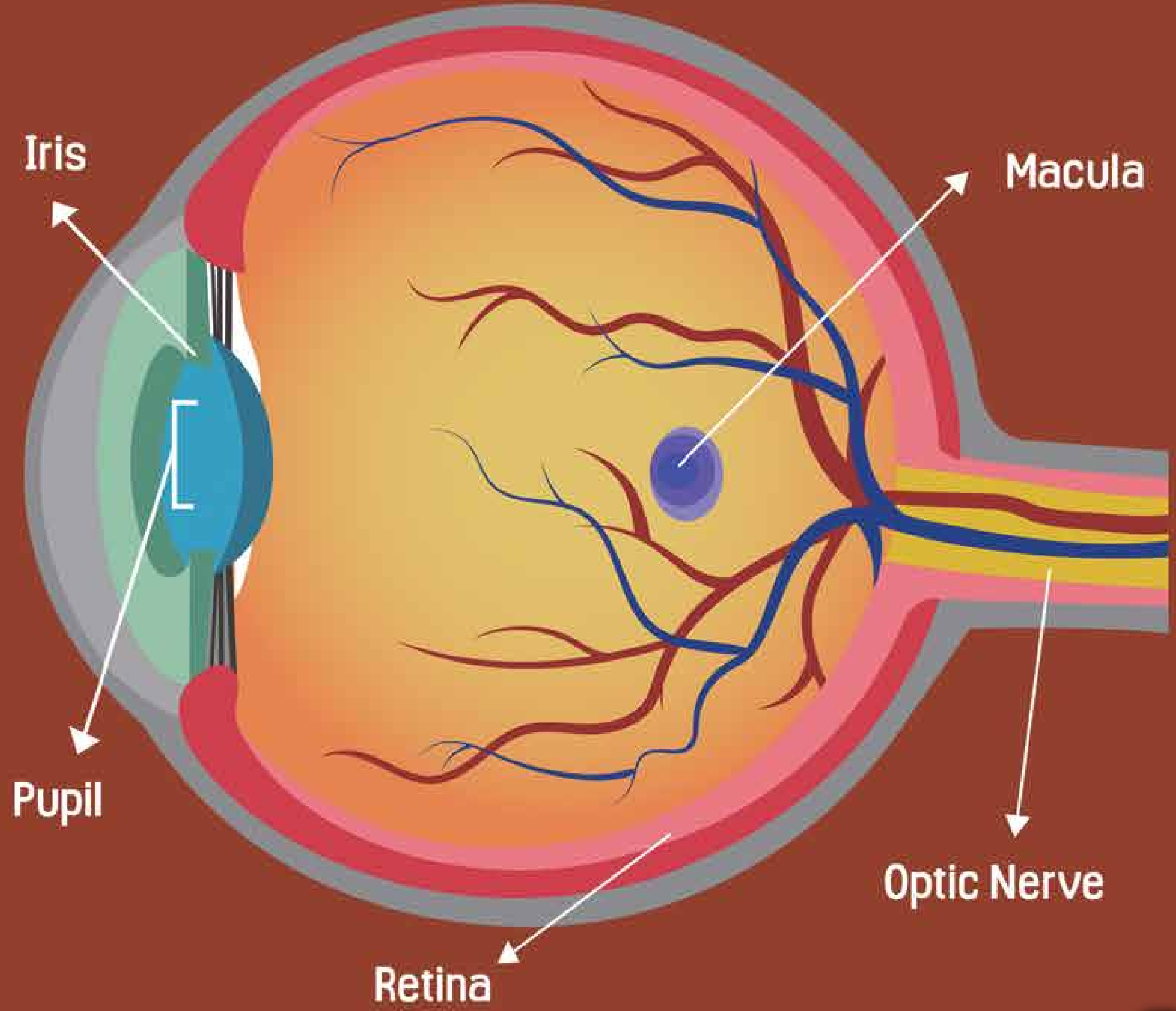
Rod cells are very sensitive to light, so they are mainly used at night to sense brightness and the outlines of objects. Unlike cone cells, rod cells cannot tell apart colors.

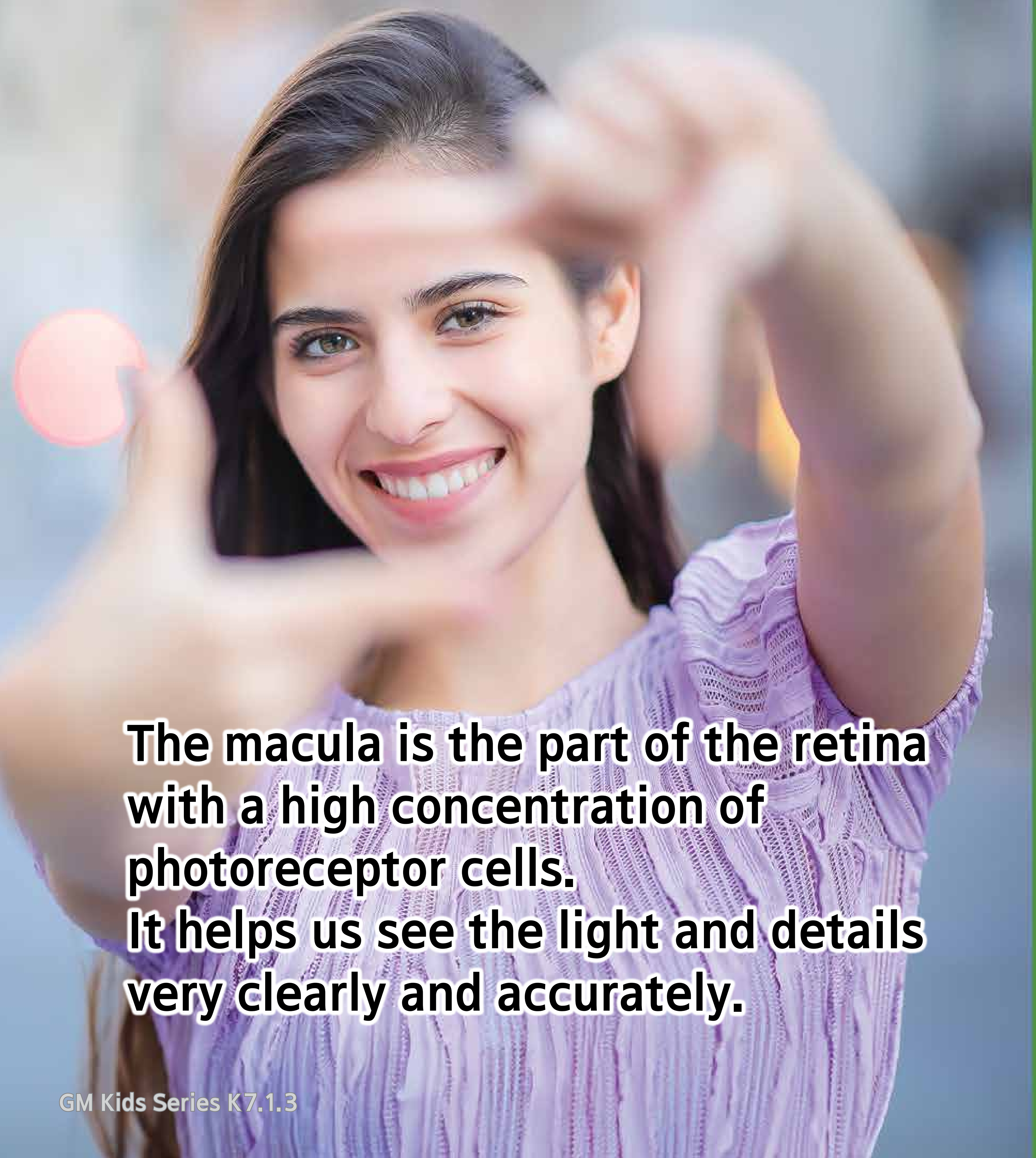
Even the brightest flower will look black and white under the faint starlight on a dark night without the moon. We can only see the flower's outline in black and white.

During the day, when there is plenty of light, the three types of cone cells process the light information.

However, the photoreceptor cells are not evenly spread across the retina. To see objects clearly, these cells are gathered in a specific area. Can you guess which area?

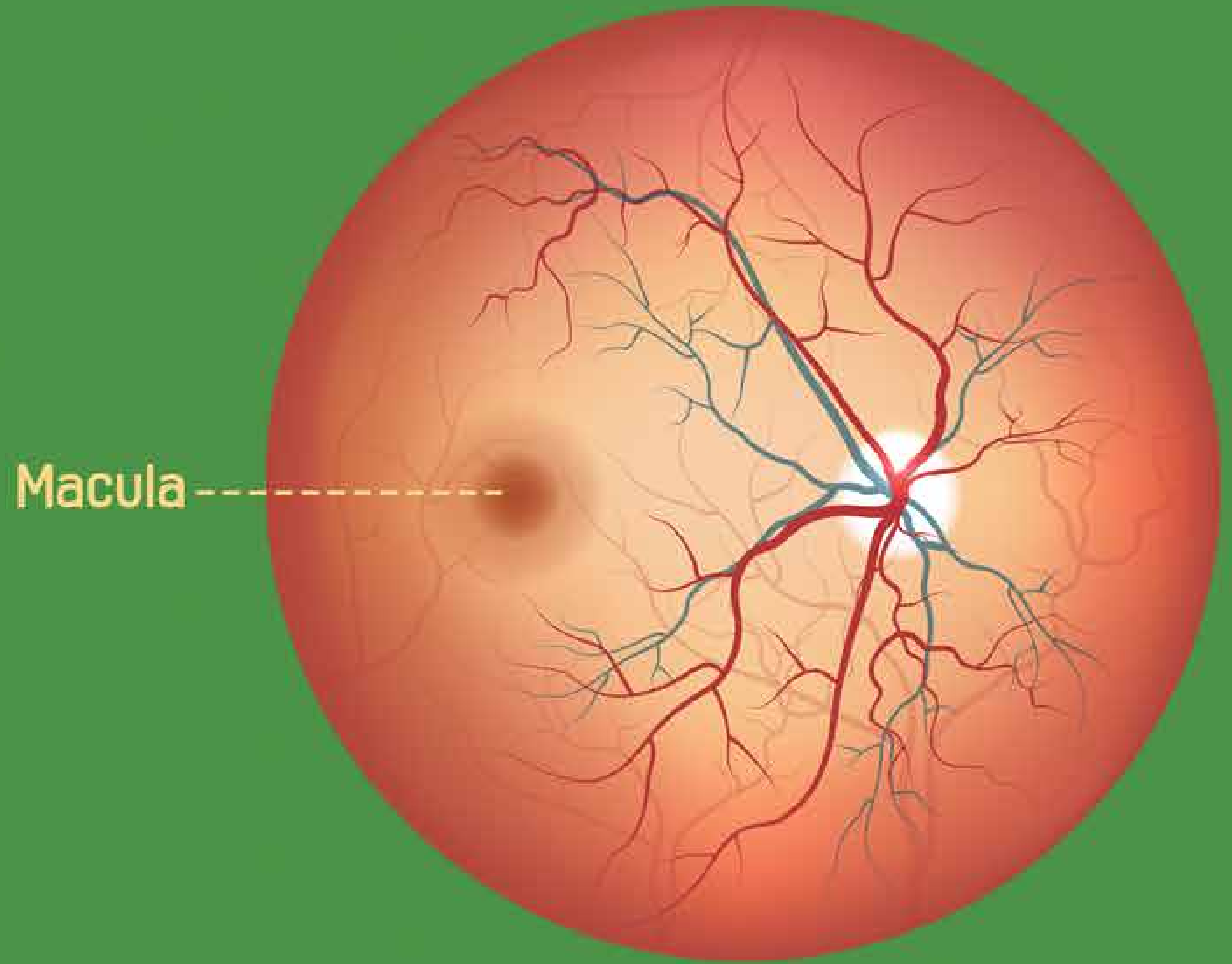
It is none other than the macula in the center of the retina.



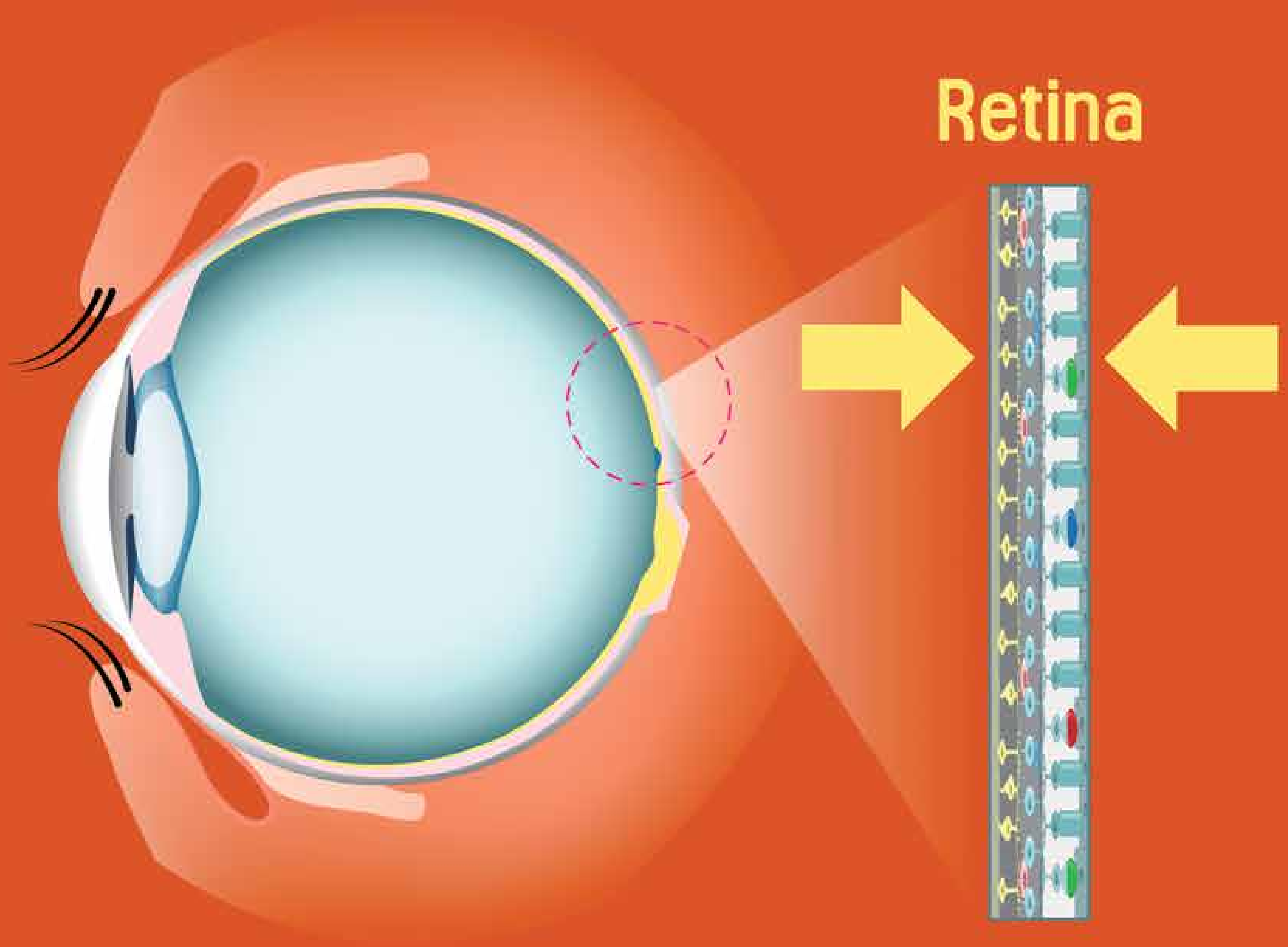


The macula is the part of the retina with a high concentration of photoreceptor cells.
It helps us see the light and details very clearly and accurately.

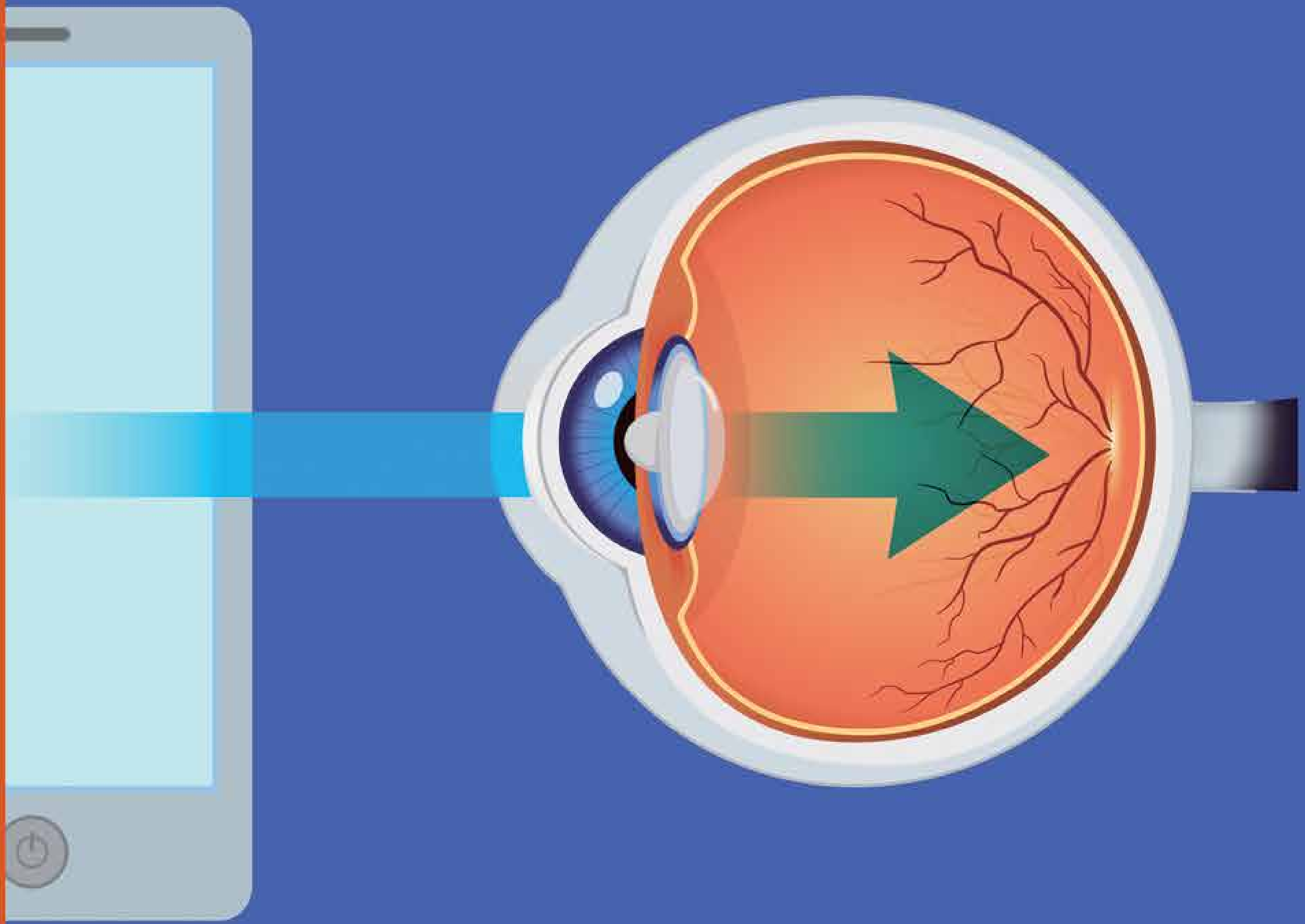
The macula is a yellow, round spot on the retina about 4 millimeters wide. In the center of the macula is a small, dimpled area called the fovea, where cone cells are densely packed.



The macula takes up a tiny portion of the retina.



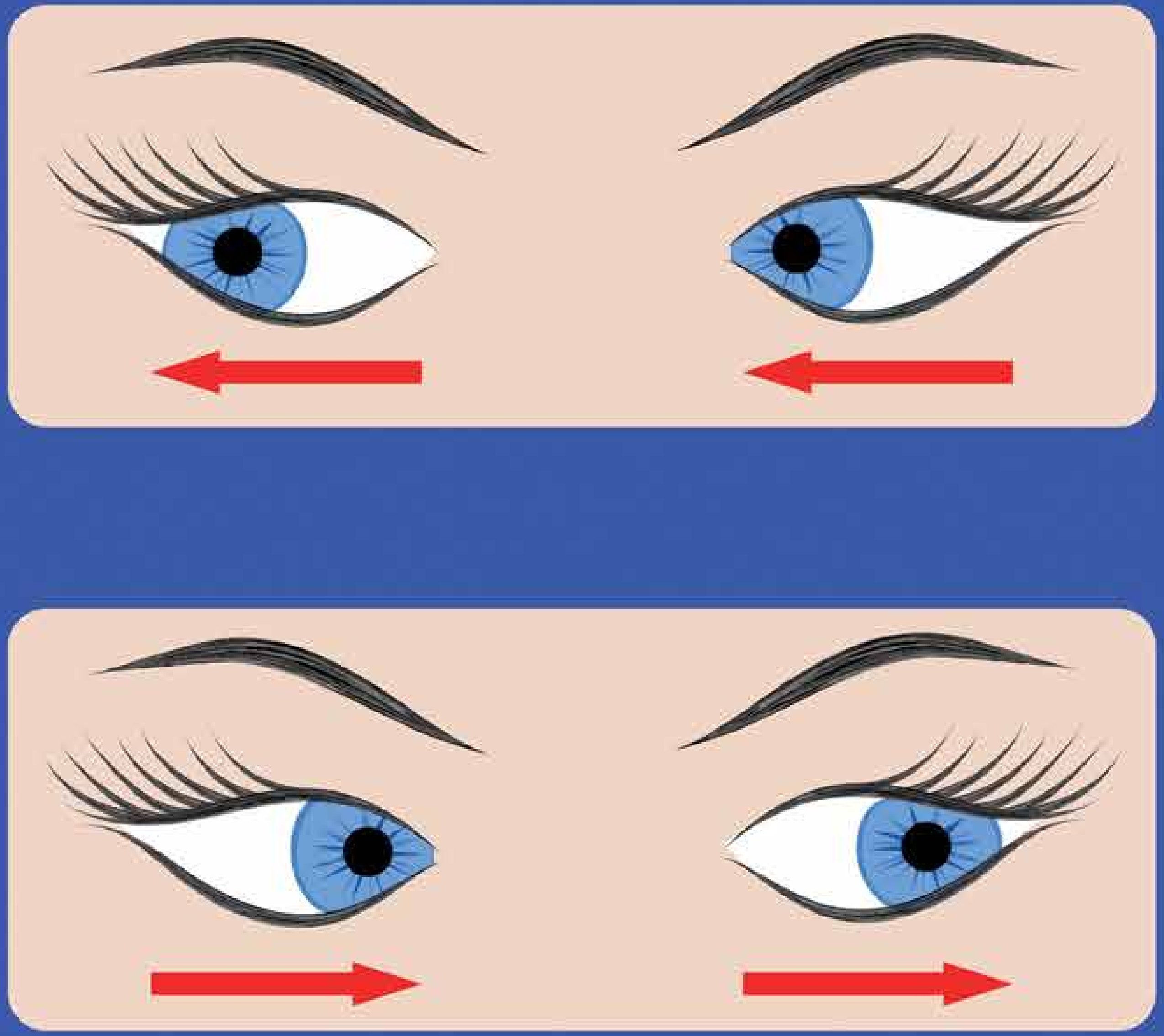
However, when light from an object enters our eyes, the lens focuses it and sends it onto the macula.



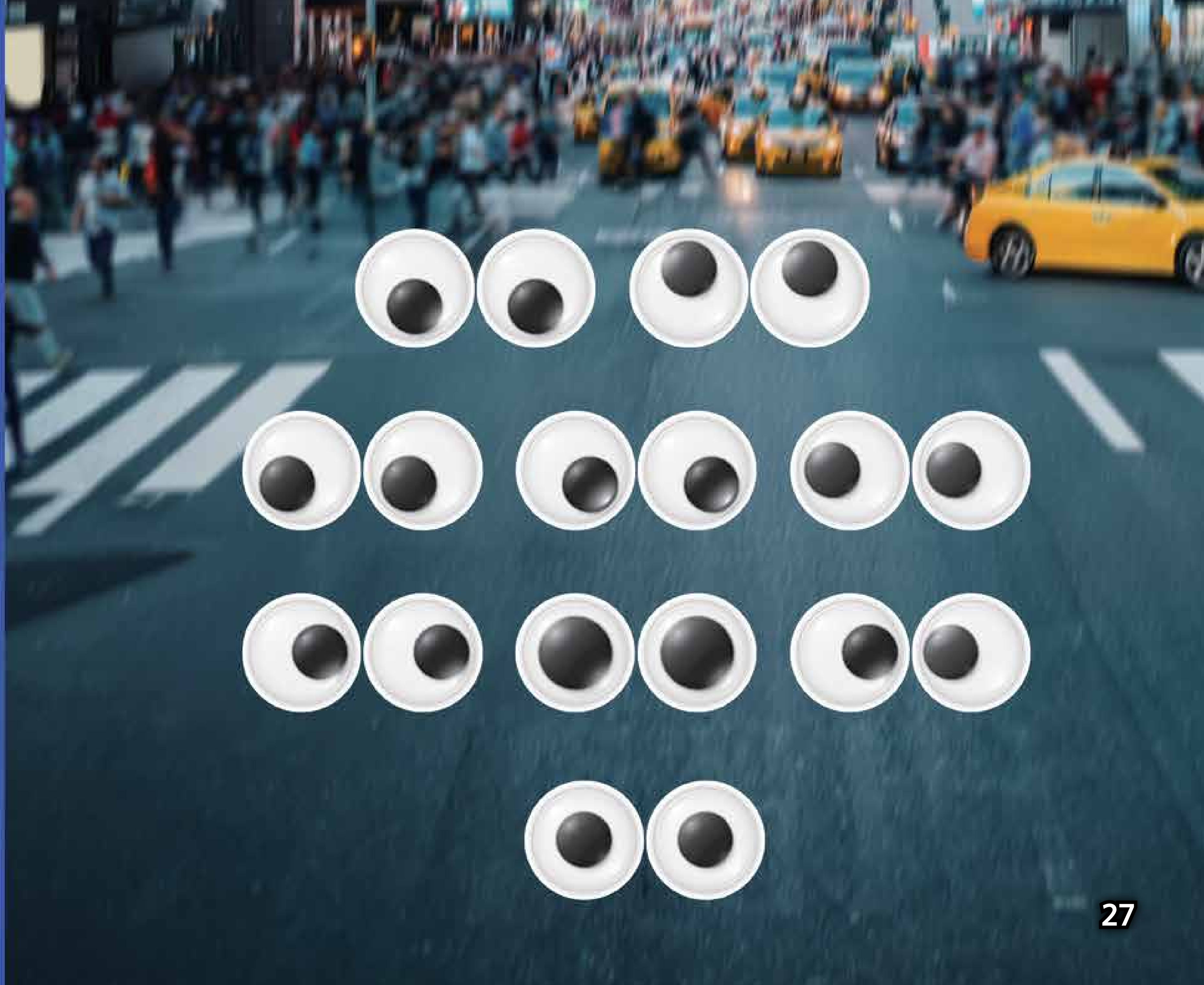
The macula is important because it helps our eyes move and focus on things.

Our eyes move differently when we look at a specific object and a wide scene.

When following a specific object, our eyes move very slowly.

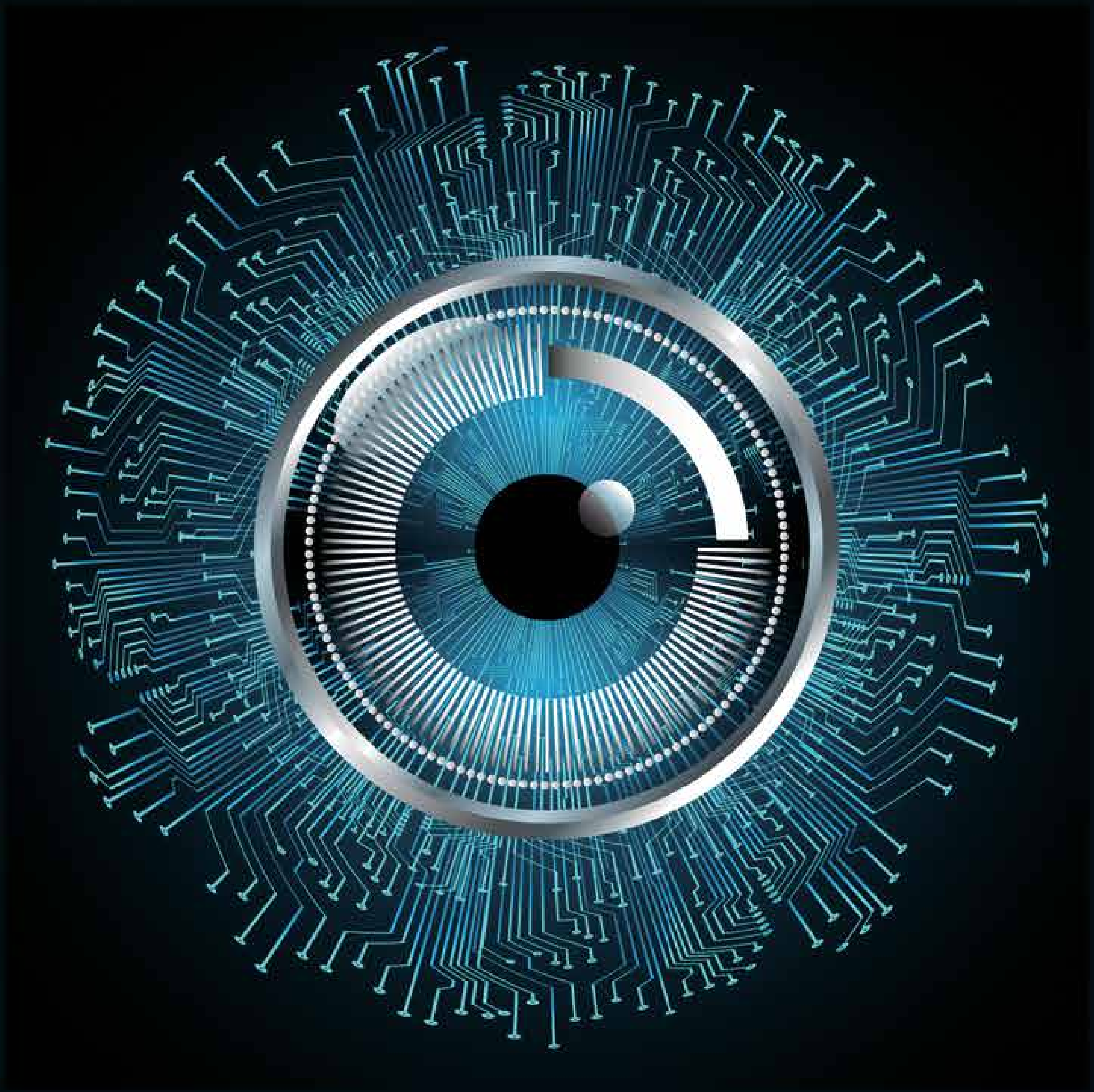


But when we look at a wide scene, our eyes move quickly in little jumps, like a machine.



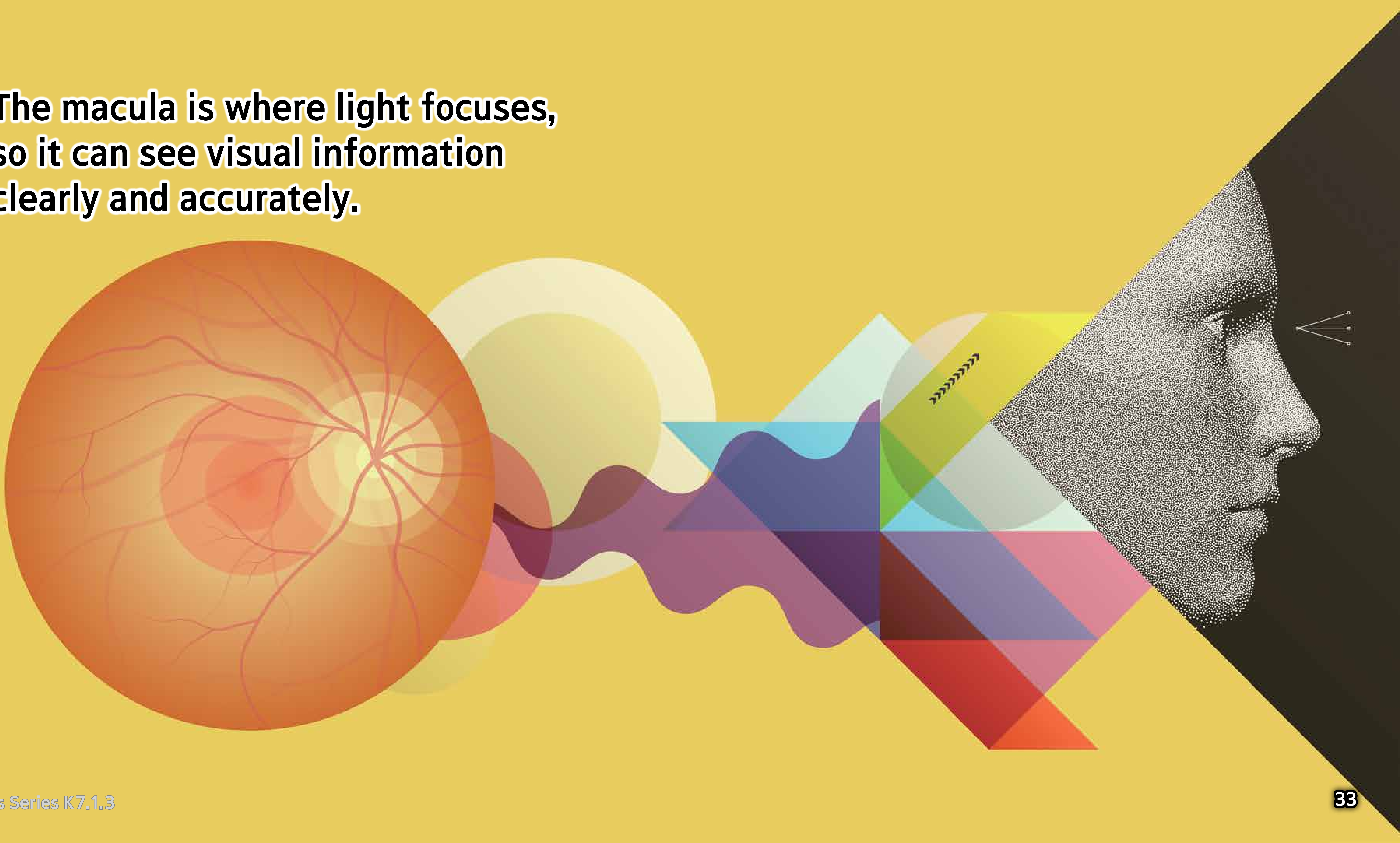
This is called
"saccadic eye movement."

But even when our eyes move
in jumps, our brain thinks they
move smoothly. Why is that?



Our eyes cannot see a wide area all at once, but they quickly scan the surroundings and send the information to the macula.

The macula is where light focuses, so it can see visual information clearly and accurately.



The macula sends this information to the brain, helping it quickly understand the whole image.

In this way, our brain uses information from the macula to see the world more clearly.