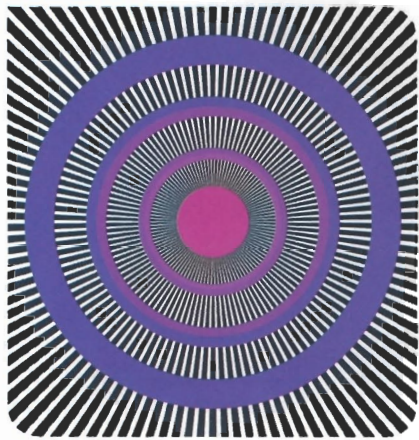




Research Footnotes

Optical Illusions Explained



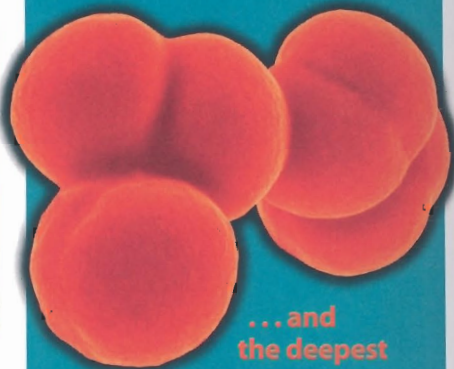
Brain researchers studying the cause of optical illusions have found that tiny eye movements called microsaccades are what create the illusion of motion in the purple circles shown here. As the rate of these movements increases, subjects perceive the circles to be moving faster. This link proves that the brain alone is not responsible for optical illusions—the effect actually begins in the eyes.

Rapid eye movements cause the appearance of motion in this image.

Highs and Lows

The highest-dwelling life ...

Two species of bacteria and one fungus live 25 miles above Earth's surface. One of the bacteria species is almost identical to the one [shown here] that causes most staph infections.



... and the deepest

A newly found species of single-celled **Archaea** lives as much as a mile beneath the seabed in boiling-hot sediment. It's closely related to the deep-dwelling species shown here.



Tricky Number

1,234,567,890

Numbers that include all the digits, from 0 to 9, are called pandigital numbers. (Pandigital quantities missing a zero are referred to as zeroless, or exclusive.) Number theorists are fascinated by these integers, which can behave in unexpected ways. For example, when you multiply 123,456,789 by 2, 4, 5, 7 or 8, the product is always also a pandigital number. And strangely, all pandigital numbers that include a zero are evenly divisible by 9. You can also create interesting pandigital variations such as 12,354,678,987,654,321, which is equal to 111,111,111 multiplied by itself.

Nature's Curiosities

What Causes Red Snow?

If you've ever been on a snow-covered mountain in the summer, you may have been surprised to see red snow. The tint is not the result of pollution but rather evidence of algal blooms on the snow's surface. Red snow algae, or *Chlamydomonas nivalis*, is found worldwide in alpine environments above 8,000 feet and is sometimes known as watermelon snow for

its distinctive fruity smell. A red photosynthetic pigment called astaxanthin gives the cold-loving species its color and helps it survive in strong visible light as well as extremely high levels of ultraviolet radiation. The algae become dormant in the winter when fresh snowfall covers them, but the blooms reemerge in the summer as the top layer of snow melts.

Red-colored algae tint permanent snow on mountains around the world.

