



Morphing Butterfly

Is a Blue Morpho Butterfly really blue?

Try this!



Look at the two butterfly wings. One wing is yellow on both sides. The other wing is blue on the front but brown on the back.



Now shine the light through the wings from the back. Do they look the same when you turn on the light?

Tip: Squeeze the light to turn it on!

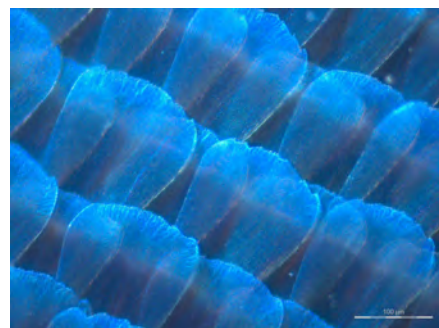
The blue butterfly wing isn't really blue! The color is created by light reflecting off tiny nano-sized structures. When you shine light through the wing, the effect is lost.

What's going on?

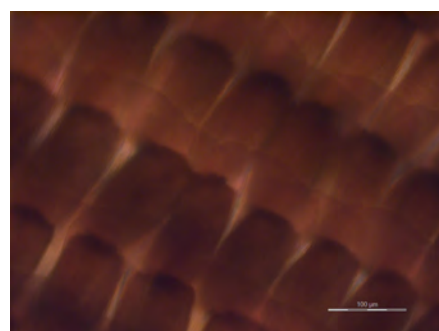
When you turn on the light, the yellow wing stays yellow, but the blue one turns brown! That's because the yellow color comes from pigment, but the blue is created by the interference of light bouncing off tiny, colorless nano-sized structures.

Blue Morpho Butterfly wings have very small overlapping scales covered with tiny "ribs." The size and arrangement of these structures makes the wings look blue—but they're actually transparent! There's a tiny air space between the ribs. Light waves bouncing off the top and bottom surfaces of neighboring ribs interfere with each other. Most light waves are canceled by the interference and only certain wavelengths—seen as colors—bounce back to your eyes. So when you look at the front of the butterfly, it's a beautiful, iridescent blue.

When the bright light passes through the Blue Morpho's wings, the effect is lost and you see the wings' brown undersides. The back side of the wings is colored by pigment—so the brown side always looks brown.



Light reflecting off the wings



Light passing through the wings



Low-energy electronic display

How is this nano?

Some nanotechnologies and materials are inspired by nature. Scientists are working on new technologies that mimic the Blue Morpho's wings. They've invented low-energy smartphone displays, paints, and fabrics that change color by changing the spacing between materials.