

## What is biomimetics?

- 1 Some **animals**, **insects** and **plants** in nature have characteristics and properties that derive from their distinctive shapes.
- 2 "**Biomimetics**" or "**biomimicry**" is a discipline that looks for inspiration in the special shapes of these organisms to create **new products** and develop **new technologies** in different areas of science.



## The Secret of Lotus Leaves

The leaves of the lotus plant, which lives in ponds and swamps, have the property of repelling water. How are they able to do this? Have a guess and write it down or draw a picture!

Hint: It looks like the secret is in the surface of the leaves!

## An electron microscope image of lotus leaves

- 1 When we magnify a lotus leaf with an electron microscope, we can see that there are lots of **bumps** on it
- 2 These **bumps** are made of a **wax-like substance**, creating an **uneven surface** that repels any water falling on the surface and prevents it from spreading
- 3 This is known as the "**lotus effect**"

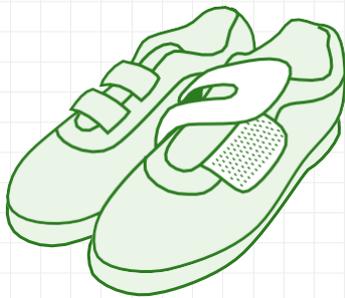


## Let's find some useful tools!

Useful tools made with biomimetics, such as by making use of the "lotus effect," are all around us. The pictures below show items made with biomimetics, inspired by other organisms.

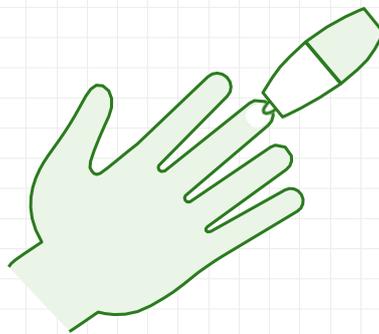
What sort of organism could it be? Look at the picture and take a guess!

Shoe hook-and-loop fastener



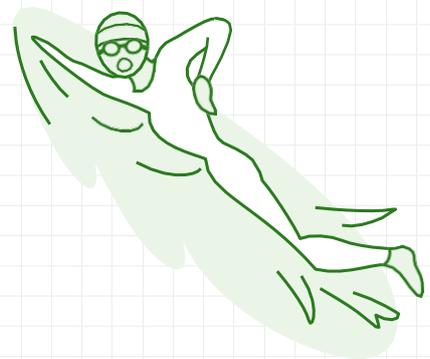
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Painless hypodermic needles



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Swimsuits for swimming faster



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### Picture of a shoe: explanation

The hook-and-loop fastener is a convenient way to put on shoes without using shoelaces. The inventor was inspired by the prickly burdock burs he found stuck to the fur of his pet dog.

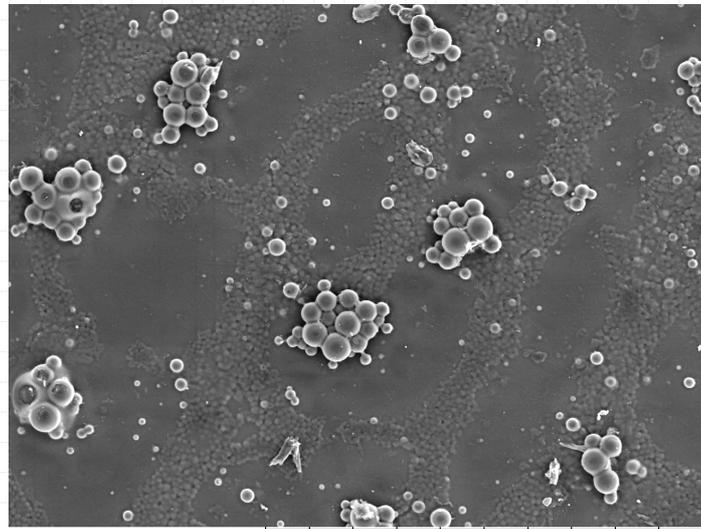
### Picture of a needle: explanation

Have you ever heard of a painless injection needle? This item was developed to relieve the stress of people who need to have their blood taken several times a day, and was inspired by the mouths of mosquitoes. Known as a microneedle, this needle is used to extract a single drop of blood instead of injecting drugs into the body.

### Picture of a swimsuit: explanation

Some swimsuits have been developed to help Olympic athletes and others swim faster. These were actually inspired by the skin of sharks. When a shark swims, small whirlpools form between its scales. These tiny vortices prevent the surface of the scales from disrupting the flow of water, and reduce resistance when the shark is swimming by ensuring that water flows smoothly.

## Electron microscope image of the bottom of a yogurt lid



If we zoom in on the back of a yogurt lid with an electron microscope, we can see solid **bumps** that look like **steamed buns**.

Much like with a lotus leaf, the countless **bumps** on the lid prevent the yogurt from sticking.

These **bumps** are not visible to the naked eye, but the back of the lid is **rough** to the touch because of them.

Using an electron microscope allows us to see that the back of the lid is **structurally similar** to a water-repellent lotus leaf. The non-stick yogurt lid was born thanks to the creation of a film that **mimics** that shape.

### Summary

We have found out that many of the useful tools around us were made with **biomimetics**. "Normal" things that you use all the time may actually be high-tech items made with incredible technology!

If you are amazed at how convenient something is and are **wondering** about it, try looking it up. It may be a useful tool made with **biomimetics**.