Scientists discover a new shape — one that skin cells take as they bend

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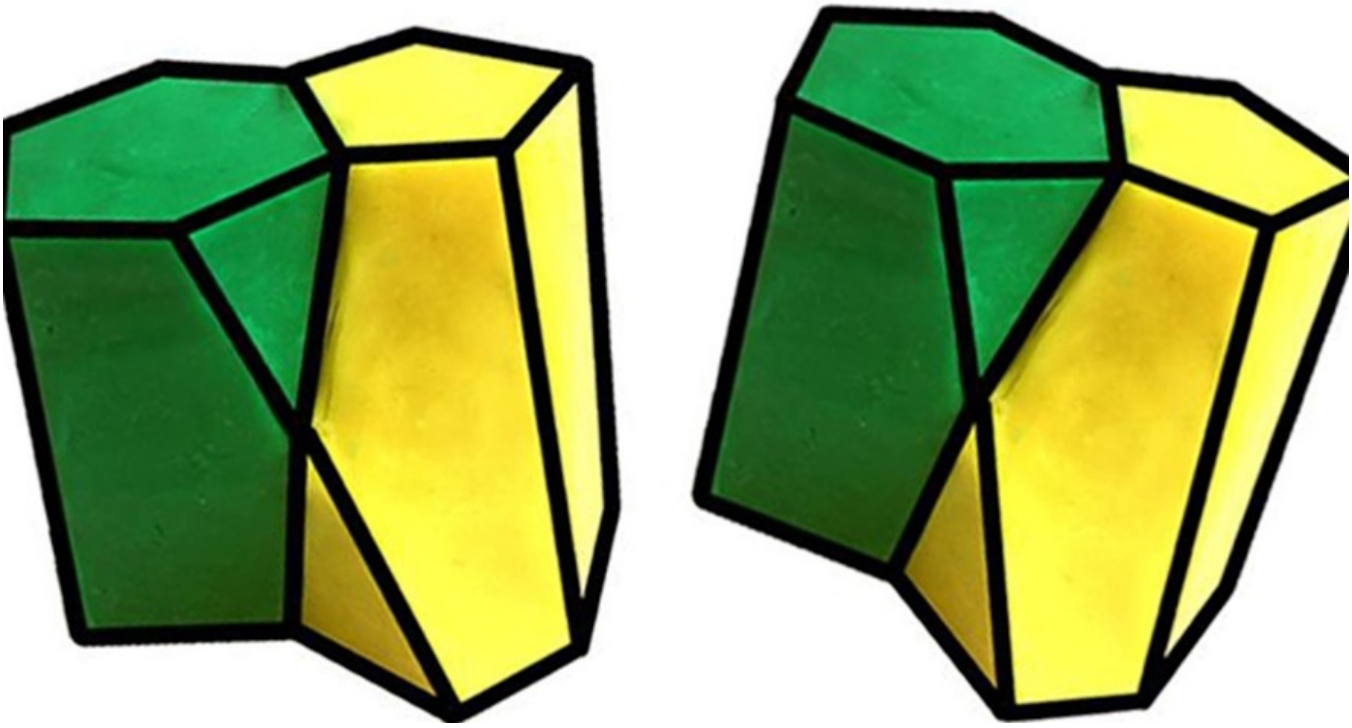


Image 1. Two scutoids tightly packed together. Photo by: University of Seville

Move over, triangles and trapezoids, there's a new shape in town.

Scientists, engineers and biologists have classified dozens of funky shapes beyond the ones we think about every day. One is the hemihelix, discovered in 2014, which sort of resembles a Slinky.

Now, biologists have found another new shape, described in a recent paper in the scientific journal Nature Communications, dubbed the scutoid. It's likely found in your armpits, up on your nose and all over your face. It's a shape that skin cells take as they bend.

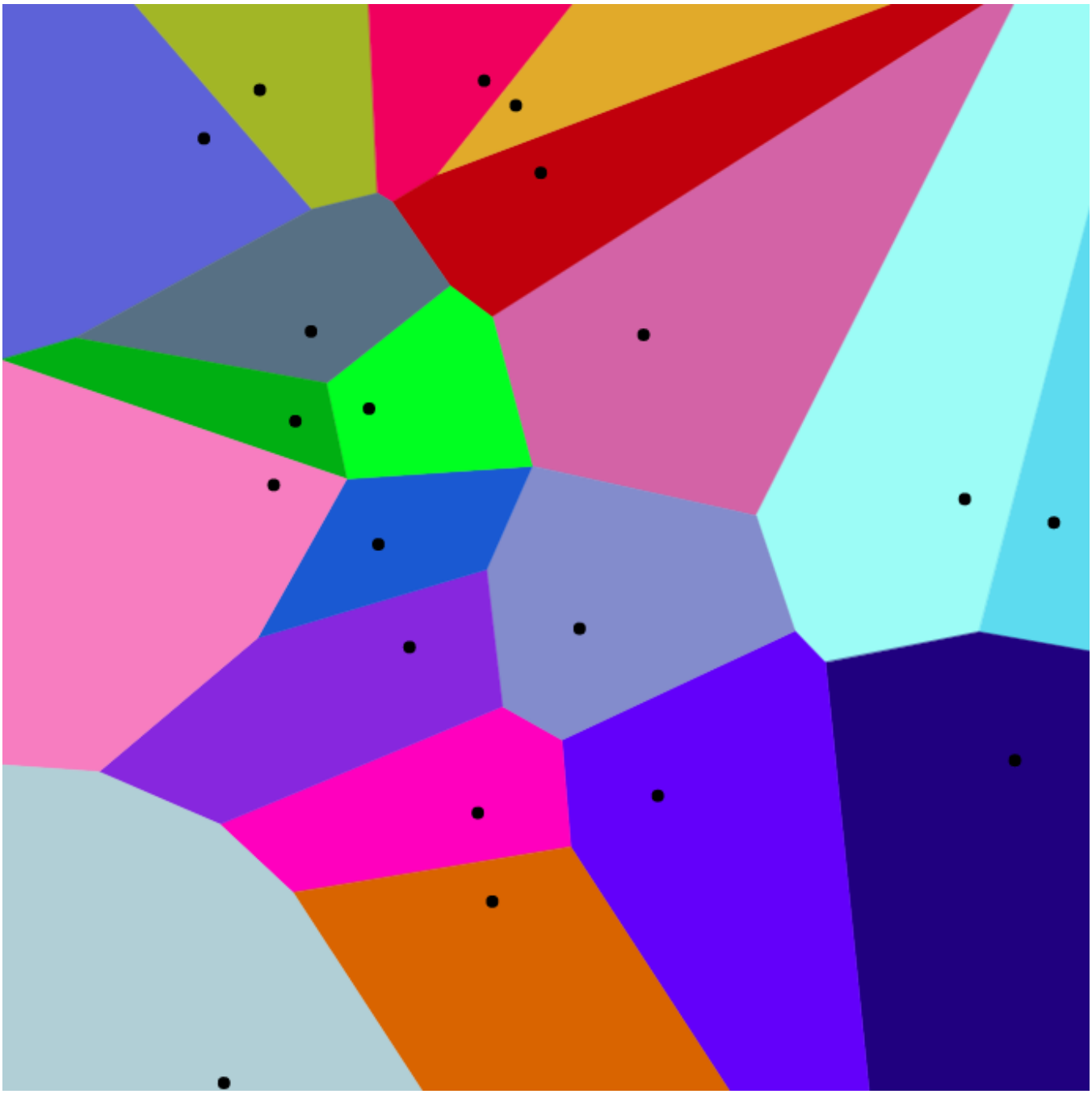
Bruce Y. Lee at Forbes Magazine reports that the new shape helps solve a long-standing mystery about human skin.

Millions upon millions of cells are packed together to create human skin. The skin is practically watertight and airtight. On a totally flat surface, column-, prism- or cube-shaped cells, for example, could be squeezed close enough together to create a strong barrier. However the human body has few, if any totally flat surfaces. This means cells shaped like cubes and columns wouldn't fit together to make a barrier.

Computer Model Solves The Mystery

Plus, when humans first are formed, they are just tiny bundles of cells, called embryos. After this, the cells that form our skin need to do some pretty extreme bending and curving in order to develop.

To solve the mystery, researchers in the U.S. and Europe collaborated on a computer model using a process called Voronoi diagramming. They hoped to figure out just how epithelial cells are packed together. In math, a Voronoi diagram is a surface separated into regions based on distance to points in a subset of that surface.



The best solution, they found, was a totally new shape the team dubbed a scutoid. It got its name because it resembles a top-down view of a beetle's scutellum, part of its shell.

The shape looks like a long five-sided prism with a diagonal face sliced off one end, giving that end six sides. That makes it possible to pack scutoids together with alternating five-sided and six-sided ends making up the surface. This allows the shapes to make curved surfaces without pulling apart.

Don't worry if this is hard to envision — the team had trouble making sense of it too. Then, one of the scientists and his daughter modeled it using clay.

Scutoid Could Help In Growing Artificial Organs

"During the [computer] modeling process, the results we saw were weird," co-author Javier Buceta of Lehigh University said. The model predicted that, as skin tissue increases in curving, "columns and bottle-shapes were not the only shapes that cells [...] developed. To our surprise, the additional shape didn't even have a name in math! One does not normally have the opportunity to name a new shape."

Reporter Jessica Boddy said that the team then found scutoid-like shapes in the skin cells of zebra fish and the salivary glands of fruit flies.

"Sesame Street" will probably not be singing a song about the scutoid anytime soon. Still, the shape could have important uses in medicine. For scientists looking to grow artificial organs, Buceta says, this discovery could help them build a sort of raised platform mechanism that encourages cells to pack together. This would accurately mimic "nature's way to efficiently develop tissues," Buceta says.

"We believe that this is a major breakthrough in many ways," co-author Luis Escudero of the University of Seville tells Boddy. "We are convinced that there are more implications that we are trying to understand as we speak."