Research highlights

SURPRISING SOURCE OF FINGERPRINTS' SWIRLING SHAPES

The arches, loops and whorls that make each person's fingerprints unique are created by some of the same genes that drive limb development.

Sijia Wang at the Shanghai Institute of Nutrition and Health, part of the Chinese Academy of Sciences, and his colleagues examined the genomes and fingerprints of more than 23,000 people from various ethnic groups. Scientists have generally assumed that fingerprints are simply a type of skin patterning; however, the team found that many of the 43 genetic regions associated with fingerprint type were also involved in limb development.

To test how these genes contribute to fingerprint formation, the researchers modified a limb-development gene called *Evi1* in mice and found that the rodents developed unusual ridge patterns on their toes. The authors add that, in humans, differences in the fingerprint-related genes also correlate with variations in the ratio of finger lengths. This suggests that, in people, genes such as *EVI1* affect how the tips of limbs stretch and grow during embryonic development.

Cell **185**, 95–112 (2022)

HOT OR NOT? THE VOLCANOES THAT BELIE THEIR NAME

Some 'hotspot' volcanoes aren't so hot after all.

Islands such as Iceland and Hawai'i are thought to form from plumes of superheated rock that rise from a depth of several thousand kilometres. These hotspot volcanoes are chemically distinct from a second type of ocean volcano that taps into shallower sources of heat and forms ridges that run through major ocean basins.

To explore temperature differences between the two types of volcano, Xiyuan Bao at the University of California, Los Angeles, and his colleagues analysed data from seismic waves generated by earthquakes. These waves travel more slowly through hotter rocks in the Earth than through cooler ones, which allowed the team to estimate the temperature hundreds of kilometres below the volcanoes' mouths.

The team found that nearly half of hotspot volcanoes are substantially hotter than mid-ocean ridge volcanoes, as conventional thinking suggests. But 15% of the hotspots are downright cold — at most a few dozen degrees warmer than ridge volcanoes.

Cold hotspots might be fed by rock rising from shallower depths than expected, or by deep plumes that somehow grow cooler at shallower depths.

Science **375**, 57–61 (2022)

MIGHTY ANTIBODY CAN FIGHT MULTIPLE VIRAL VARIANTS

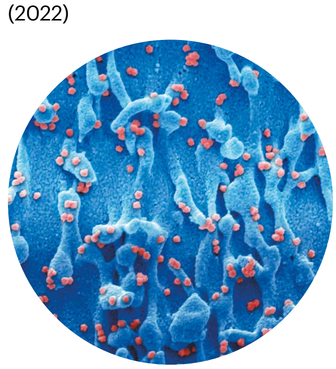
An antibody that blocks SARS-CoV-2 from infecting cells could one day be used to treat infections caused by variants of the virus that causes COVID-19, and even related viruses.

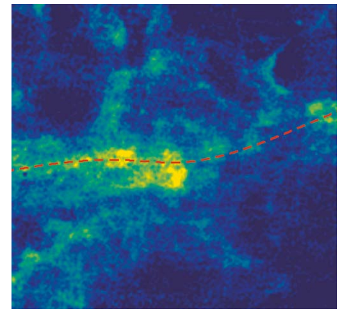
David Veesler and his colleagues at the University of Washington, Seattle, searched the blood of an infected person for antibodies that bind to the SARS-CoV-2 spike protein, which helps the virus enter human cells. They uncovered one particularly potent antibody, called S2K146, that protected cells from infection with the original strain of SARS-CoV-2 and several variants. (The authors have since shown that S2K146 protects cells from the Omicron variant, too.)

S2K146 also binds to the spike protein of two related viruses: SARS-CoV, which caused an outbreak of disease in 2002–2003, and WIV-1, which infects bats and has the potential to infect humans. Giving S2K146 to hamsters infected with SARS-CoV-2 (viral particles pictured, pink, on a cell) greatly reduced or eliminated viral replication.

Mutations that prevented S2K146 from binding to the spike protein also rendered SARS-CoV-2 much less effective at infecting cells, suggesting that the virus is unlikely to mutate its way out of S2K146's grasp.

Science https://doi.org/hb7h (2022)





CLOUD STREAMING: GALACTIC FILAMENT COULD BIRTH STARS

A long filament-like cloud of hydrogen atoms lurking on the far side of the Milky Way is among the largest such structures in the Galaxy — and offers a rare glimpse into one of the earliest stages of star formation.

Scientists first reported evidence of the filament (indicated in picture by dashed red line), which they nicknamed Maggie, in 2020. Now, some of those scientists, including Jonas Syed at the Max Planck Institute for Astronomy in Heidelberg, Germany, along with more astronomers, have conducted a detailed follow-up investigation. It shows that the filament stretches some 1,200 parsecs, roughly 1,000 times the distance from the Sun to its nearest stellar neighbour, Proxima Centauri.

Theory predicts that, over time, the neutral hydrogen atoms in the filament will pair up, forming dense clouds of hydrogen molecules. Such clouds ultimately give birth to stars.

As to how Maggie wound up oriented parallel to the plane of the Milky Way but fairly far from it, Syed and his colleagues speculate that oscillations in the density of the Milky Way might have pushed the filament out.

Astron. Astrophys. **657**, A1 (2022)

L TO R: MARIO TAMA/GETTY; STEVE GSCHMEISSNER/SPL; J. SYED/MPIA