SCIENTIFIC AMERICAN

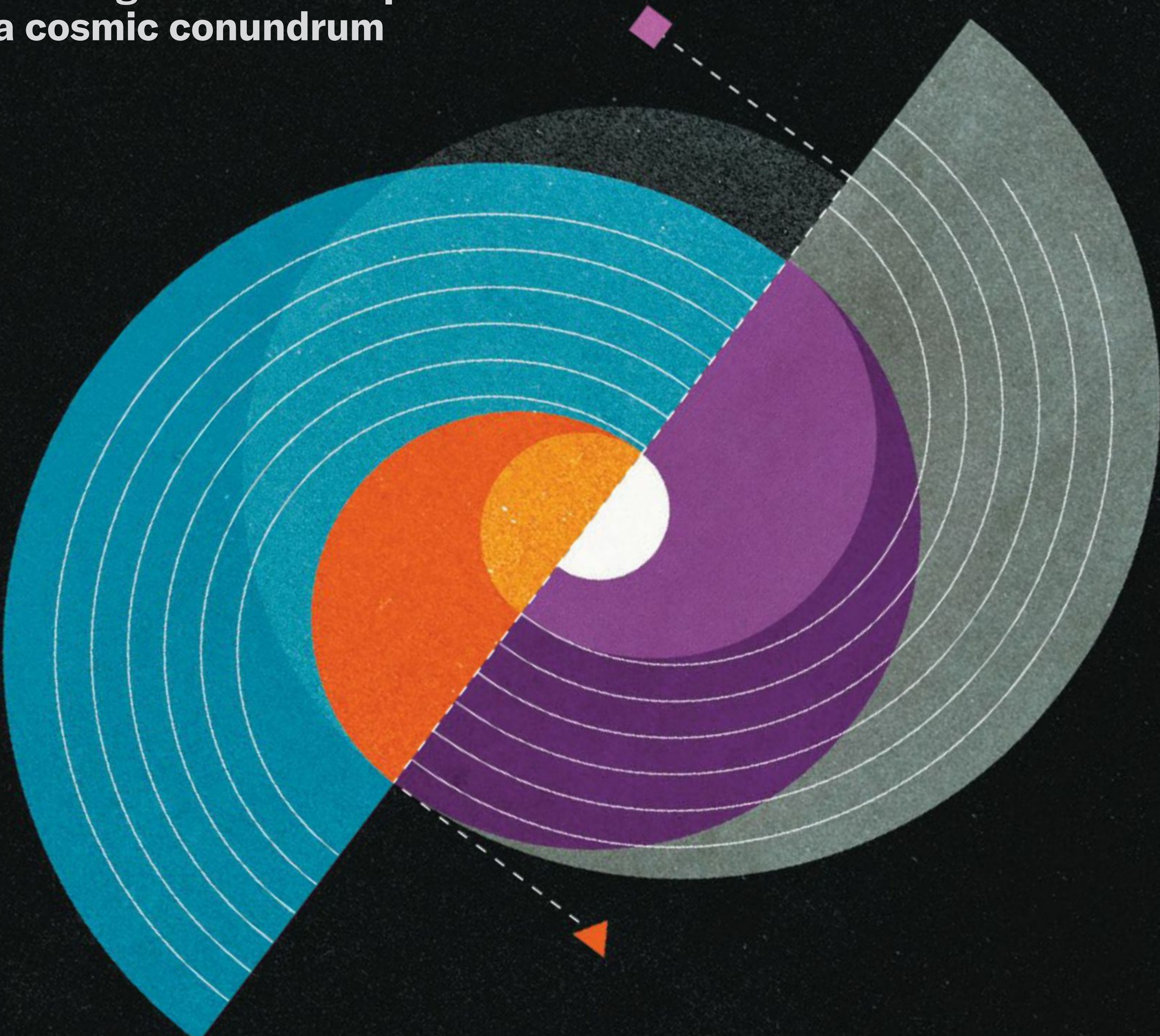
The Truth about Kids Today

The Weirdest Flower on Earth

Why Are Alpine Lakes Turning Green?

A Galactic Mystery

Missing dark matter presents a cosmic conundrum



APRIL 2026
SCIENTIFICAMERICAN.COM

Veronika is "exploiting distinct properties of a single object for different functions," the researchers write.

gions that would otherwise be difficult for her to reach. She precisely manipulated the broom with her mouth, using her tongue to lift it and her teeth to secure it in place. She targeted the thick-skinned upper areas of her body with the bristled end and the more sensitive underparts with the smooth stick end. She also scrubbed more vigorously on tougher parts of her skin and used gentle pushes on her delicate parts.

To the casual observer, using a broom to scratch an itch might not seem like an act of genius. But the way Veronika changed her grip on the broom and her movement of it in anticipation of the outcome calls to mind tool-using behaviors in the famously clever primates and corvids (crows and their kin). Moreover, the way she uses the two broom ends differently "constitutes the use of a multipurpose tool, exploiting distinct properties of a single object for different functions," Osuna-Mascaró and Auersperg write in their paper on the findings, published in *Current Biology*. Among nonhuman species, that kind of multipurpose tool use has been consistently documented only in chimpanzees.

Such abilities may be widespread in cattle. "We don't believe that Veronika is the Einstein of cows," Osuna-Mascaró says. Together with anecdotal reports of tool use in cattle from South Asia, the results hint that the capacity for complex problem-solving behaviors, including tool use, might have ancient evolutionary roots but that such behaviors emerge only when conditions are favorable.

As a companion animal, Veronika, now 13 years old, has lived a long life in a stimulating environment. Nötsch im Gailtal is "the most idyllic place imaginable for an Austrian cow, like straight out of *The Sound of Music,*" Osuna-Mascaró says. He says the family contributed to Veronika's tool use by "providing the special conditions that enabled Veronika to express herself." Although she learned to use tools on her own, starting with branches that had fallen from trees, Wiegele later furnished her with sticks and rakes that allowed her to perfect her scratching techniques. Most livestock animals, in contrast, live much shorter lives and spend their time in impoverished settings such as factory farms without access to objects that they can manipulate.

"This is fantastic! I applaud the authors, as well as Veronika," says primatologist Jill Pruetz of Texas State University, who was not involved in the new research. Pruetz studies how environmental factors influence the behavior of tool-using chimpanzees. She also has two companion cows of her own, Claire and Edith. "I am not completely surprised that cattle can use tools—after living in close proximity to my two cows for about seven years now, I have a lot more respect for bovine intelligence," Pruetz says. "What strikes me about Veronika's tool use is the precision with which she can manipulate the tool as well as switch its ends to target specific areas."

The new paper, Pruetz adds, illustrates the need for enrichment for the welfare of cattle. "There are around 1.5 billion heads of cattle in the world, and humans have lived with them for at least 10,000 years. It's shocking that we're only discovering this now," Osuna-Mascaró says. "We know more about the tool use of exotic animals on remote islands than we do about the cows we live with. But we are now starting to be sensitive enough to observe them and give, at least to a few of them, the life they deserve, one in which they have the opportunity to play, interact with objects, and discover how to use them on their own."

—Kate Wong

Cavallini James/BSIP/Universal Images Group/Getty Images

MICROBIOLOGY

Microbes Afloat

Spaceflight supercharges viruses' ability to infect bacteria

BACTERIA AND THE VIRUSES that infect them are perpetually at war. Their deadly clashes push both kinds of microbes to evolve new traits that meet the challenges of every environment they inhabit, from the human digestive tract to the seafloor's hydrothermal vents—and even the harsh conditions of space.

To see how microgravity changes certain microbes, researchers sent bacteria-infecting viruses called bacteriophages to the International Space Station, and they found that the viruses adapted in ways that made them even more effective at infection.

In the experiment, detailed in *PLOS Biology*, the team incubated specimens of common lab bacteriophage T7 alongside its foe, *Escherichia coli* bac-

Escherichia coli bacteria went up against viruses on the International Space Station.

teria, for varying durations. They ran the same experiment on Earth and in space; the terrestrially reared viruses infected bacteria within two to four hours, but those in space took more than four hours to breach bacteria's defenses. The infection took longer in orbit because microgravity is an unfamiliar stressor to which both microbes must adapt, the researchers suggest.

Once the viruses adapted to microgravity by subtly shape-shifting, though, they became even more effective bacteria killers. "A simple microgravity experiment exposes these mutations that have much higher efficacy against pathogens," says senior study author Srivatsan Raman, a chemical and biological engineer at the University of Wisconsin–Madison.

The difference between Earth and space may have to do with mixing. "Under normal gravity, fluid motion continually stirs the environment, increasing the chances that viruses and bacteria will meet," explains Ester Lázaro, an astrobiologist who was not involved in the study. "In microgravity, this natural mixing is drastically diminished or disappears altogether." To overcome this lack of mixing, microbes grown in low gravity changed on a genetic level. The bacteriophages gained mutations that slightly change the shape and structure of their outer membranes, for example, helping them grab onto the bacteria they're attacking.

On their return to Earth, the space viruses were placed alongside a different strain of *E. coli* that's responsible for particularly stubborn urinary tract infections and frequently resistant to bacteriophages. The evolved viruses were able to kill that bacterium, which Raman says is "really quite promising." If exposing these bacteria-targeted viruses to new environmental stressors makes them more potent, scientists might be able to create versions strong enough to help the body fight treatment-resistant bacteria.

"T7 is one of our iconic model organisms, so there's a lot known about this bacteriophage," says Evelien Adriaenssens, a researcher at the Quadram Institute in England, who was not involved in the study. "It was cool to see that if you go into a different environment, there's still new knowledge that comes up." —*K. R. Callaway*

NASA