Unprecedented germ diversity found in remote Amazonian tribe

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In this Sept. 7, 2012 file photo, Yanomami Indians dance in their village called Irotatheri in Venezuela's Amazon region. In a remote part of the Venezuelan Amazon, scientists have discovered that members of a village isolated from the modern world have the most diverse colonies of bacteria ever reported living in and on the human body. The microbiome—the trillions of mostly beneficial bacteria that share our bodies—plays a critical role in maintaining health. Friday's study raises tantalizing questions about the microbial diversity of our ancestors, and whether today's Western diets and lifestyles strip us of some bugs we might want back. (AP Photo/Ariana Cubillos, File)

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Most surprising, this group of Yanomami Indians harbored bacteria containing genes with the ability to resist antibiotic treatment, even though the villagers presumably were never exposed to commercial medications.

This isolated population offers "a unique opportunity to put our microbial past under the microscope," said lead researcher Jose Clemente, an assistant genetics professor at the Icahn School of Medicine at Mount Sinai Hospital in New York.

The results bolster a theory that diminished microbial diversity in Western populations is linked to immune and metabolic diseases—allergies, asthma, diabetes—that are on the rise, said senior author M. Gloria Dominguez-Bello of NYU Langone Medical Center.

"The challenge is to determine which are the important bacteria whose function we need to be healthy," she said.

Everyone carries a customized set of microbes that live in our noses and mouths, on our skin and in our intestines. This microbial zoo starts forming at birth and varies depending on where you live, your diet, if you had a vaginal birth or a C-section and, of course, antibiotic

exposure.

Most of what scientists know about the human microbiome comes from studies of Americans, such as the U.S. government's Human Microbiome Project, or of Europeans. But increasingly, scientists are attempting to compare non-Western populations, especially those that keep traditional lifestyles like the isolated Yanomami.

"It's a fascinating study," Dr. Lita Proctor of the National Institutes of Health, who wasn't involved in the new research. "The more diverse your microbiome, the more those microbes bring properties to your body that you might need."

The Yanomami continue to live a hunter-gatherer lifestyle in rainforests and mountains along the border of Venezuela and Brazil, and as a group are fairly well-known. But Friday's research, reported in the journal *Science Advances*, stems from the discovery of a previously unmapped Yanomami village in the mountains of southern Venezuela. Researchers aren't disclosing the village's name for privacy reasons but say it was first visited by a Venezuelan medical expedition in 2009 that collected fecal, skin and mouth swab samples from 34 villagers.

Scientists compared the bacterial DNA from those villagers with samples from U.S. populations and found the Americans' microbiomes are about 40 percent less diverse. The Yanomami's microbiomes also were somewhat more diverse than samples from two other indigenous populations with more exposure to Western culture—the Guahibo community of Venezuela and rural Malawi communities in southeast Africa.

Intriguingly, the Yanomami harbored some unique bacteria with beneficial health effects, such as helping to prevent the formation of kidney stones, the researchers reported.

Then genetic testing uncovered silent antibiotic-resistant genes lurking in some bacterial strains. Antibiotics still could kill the bugs. But when the genes were switched on, by antibiotic exposure, they could block activity of some common modern antibiotics, said study co-author Guatam Dantas of Washington University School of Medicine in St. Louis.

Today, exposure to antibiotics in medicine or agriculture spurs germs to become harder to treat. But bacteria in soil were a natural source of early antibiotics, Dantas explained, and probably these villagers at some point picked up those bugs which had evolved resistance genes as a defense from competitors. He said it suggests people have a natural reservoir of genes that may have other duties but that can activate to trigger drug resistance in the right environment.

"It emphasizes the need to ramp up our research for new antibiotics because otherwise, we're going to lose this battle against infectious diseases," Dantas said.

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