

Scientists begin census of microbes: the trillions that live in or on us

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Scientists are beginning a large-scale effort to identify and analyze the vast majority of cells in or on your body that aren't of human origin.

Only about 10 percent of the trillions of cells that make up a person are truly human, researchers say. The other 90 percent are bacteria, viruses and other microbes swarming in your gut and on your skin.

"We really are a superorganism," Brett Finlay, a microbiologist at the University of British Columbia in Vancouver, said in an e-mail. "From the moment we are born until we die, we live in a symbiotic relationship with our microbes."

"At birth, babies emerge from a sterile environment into one that is laden with microbes," said Laurie Comstock, a microbiologist at Harvard Medical School in Boston. "The infant's intestines then rapidly become home to one of the densest populations of bacteria on Earth."

Most of these microbes are harmless, researchers say. Many are necessary to life and health. A troublesome minority, however, can cause everything from teenage acne and obesity to autism and cancer.

The National Institutes of Health has launched a \$115 million, five-year project to identify, analyze and catalog hundreds of microbial species resident in or on the human body.

Called the Human Microbiome Project, it's modeled after the Human



<u>Genome</u> Project, which decoded most of the human <u>genes</u> in the 1990s. The first 35 microbiome research grants took effect this summer.

"The composition of the complex <u>microbial communities</u> inhabiting the human body has a tremendous influence on human health and disease," said Richard Gibbs, a leading human genome researcher at the Baylor College of Medicine in Houston. Gibbs received a grant to sequence the genes of 400 bacterial strains by 2011.

The goal of the Microbiome project, which is international in scope, is to identify which microbes are harmful and to figure out ways to prevent or treat diseases they cause.

It's a bewildering task because scientists estimate there are about 1,000 different species of microbes living in the human gut and about as many more separate species on human skin.

The microbes form tiny colonies of bacteria that settle in different areas of the body. Jeffrey Gordon, a microbiologist at the University of Washington in St. Louis, likened them to "ecosystems," similar to those that plants and animals form on islands on Earth.

The most popular site for human skin microbes, surprisingly, is the forearm, which is home to 44 different microbial species, according to a recent study by Julia Segre, a microbiologist at the National Human Genome Research Institute in Bethesda, Md. The most barren region is behind the ear, where only 15 species typically settle, she reported in the journal Science last May.

"Hairy moist underarms lie a short distance from dry forearms, but these two niches are as ecologically dissimilar as rainforests are to deserts," Segre said.



Different tribes of microbes are associated with different maladies. For example, bacteria associated with the skin disease psoriasis favor the outer elbow, Segre reported. Eczema bugs prefer the inner elbow.

Microbes also vary between people. Matthias Tschoep, an obesity expert at the University of Cincinnati's College of Medicine, identified 383 microbial genes that differed significantly between pairs of obese and slender twins. Microbes in obese people harvest sugars and fats in the diet more efficiently than do others on slender people, he reported in Nature.

"It is possible that drug targets or drug candidates for the treatment of obesity could be identified from the obesity-associated microbiome," Tschoep said.

At a Conference on the Beneficial Effects of Microbes held in San Diego last fall, scientists described many ways in which microbes can be helpful -- even essential -- to humans.

Bacteria in the gut make it possible to digest food, synthesize vitamins, remove toxins and develop the immune system after birth.

One of the new Human Microbiome grants went to Robert Modlin, a dermatologist at the University of California, Los Angeles, to study <u>microbes</u> lurking under the skin that cause 17 million Americans -- including 80 percent of those age 12 to 24 _ to suffer from acne.

"Success may lead to the development of new, effective therapeutic strategies for treatment of acne," Modlin's grant announcement declared.

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