

# Belly button bacteria under the microscope

November 8 2012, by Matt Shipman

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Ever wonder what's living in there?

(Phys.org)—Researchers have discovered which bacteria species are most commonly found in our bellybuttons, but have still not discovered what governs which species will be found on which people. These are the first published findings of the [Belly Button Biodiversity](#) project led by NC State's Dr. Rob Dunn.

The researchers swabbed the belly buttons of 66 study participants, and then processed the samples using high-throughput genetic sequencing to identify each of the phylotypes present in a sample and how prevalent each phylotype was. For the purposes of this study, a phylotype was defined as an organism whose sequence in the 16s rDNA gene

(essentially the microbial fingerprint gene) varied from other [organisms](#) by at least three percent.

The researchers found thousands of phylotypes, but only a handful were found on a significant number of people. The vast majority of phylotypes were only found once or twice. Images of some of the phylotypes [are available here](#).

Specifically, the study identified 2,368 different phylotypes – including, for the first time, three phylotypes of [Archaea](#) – but only eight phylotypes were found on at least 70 percent of the study participants. And those eight phylotypes were also among the most abundant – meaning that when they were present, there were a LOT of them. In fact, those eight phylotypes accounted for almost 50 percent of the total abundance of [bacteria](#) in the samples.



Some of the most common taxa found in the study belong to the genus *Micrococcus*, part of the Actinobacteria group of bacteria. [Click to enlarge](#).  
Credit: Belly Button Biodiversity

"The common, [abundant species](#) are from a relatively small number of evolutionary lines, indicating that they have evolved traits that make them at home on [human skin](#)," says Dunn, who is co-author of a paper describing the work. "However, we are still trying to figure out what determines which of these species are found in a given person's [belly button](#). We've looked at sex, age, [ethnicity](#) and a number of other factors

– none of them are predictive of which species live in that person."

The researchers launched this project, in large part, because it has become increasingly clear in recent years that the collection of organisms on our skin forms our first line of defense against pathogens.

"We know that without these microbes our immune systems won't function properly," Dunn says. "In fact, this collection of microbes must have a certain composition – must form a certain microbial ecosystem – in order for our immune system to function properly. This work is a significant step toward helping us understand which [species](#) are the most important players in those ecosystems."

Researchers chose to sample the belly button for two reasons. First, it is a representative site on the body that is not disturbed very often. Second, the research team wanted to engage the public in science – "and the belly button is inherently ridiculous," Dunn says. "It gets people's attention."

Altogether, the researchers found that the average belly button among study participants contains 67 different phylotypes of bacteria. And many of those bacteria were quite unexpected – including some normally found only in marine environments or in foreign soils.

The paper, "A Jungle in There: Bacteria in Belly Buttons are Highly Diverse, but Predictable," is published online in *PLOS-ONE*.

**More information:** [dx.plos.org/10.1371/journal.pone.0047712](https://doi.org/10.1371/journal.pone.0047712)

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