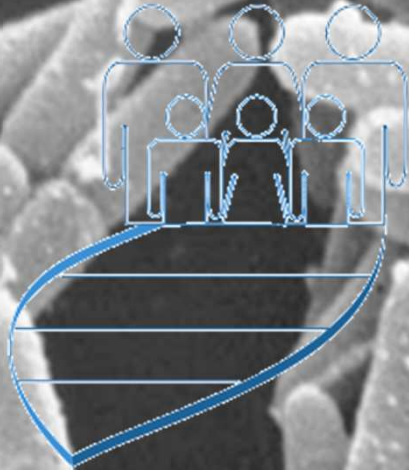


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Life Sciences/HHMI

OutReach
PROGRAM



Your Body Is an Ecosystem

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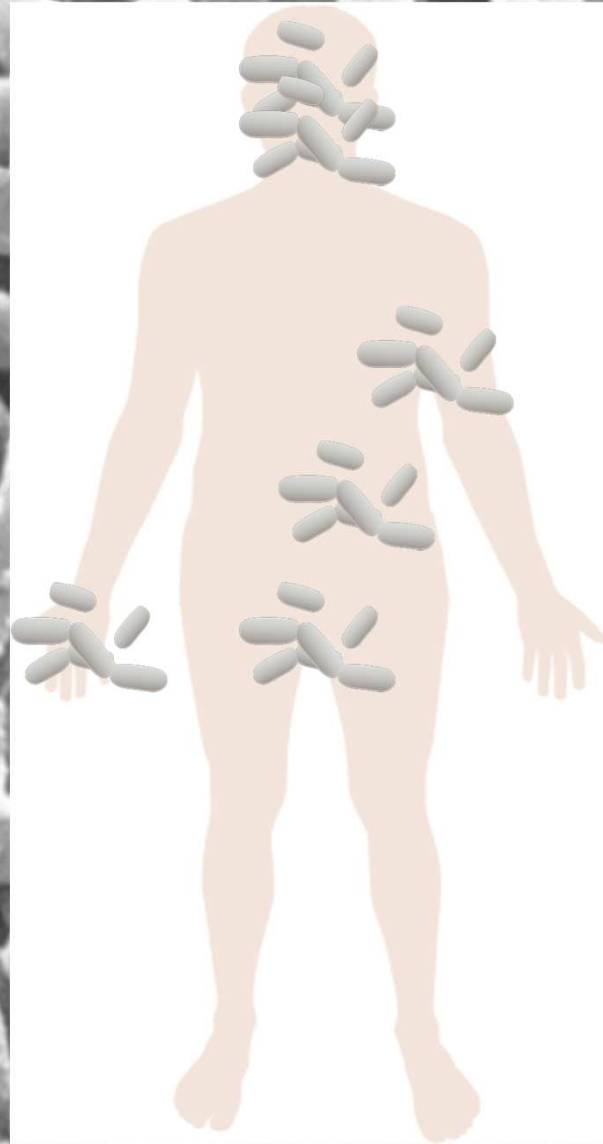
Summer 2010 Workshop
in Biology and Multimedia
for High School Teachers

You are only 10% YOU.
..
at least on the cellular level.

The Numbers

- Scientists estimate there are approximately 100 trillion microbes living in and on the body.
- Most of these bacteria are not harmful, and some are even beneficial!
- There are over 1000 species of bacteria living on the body, but any two random people have very few of these species in common.

The Locations



The Distribution

- The Nose – approximately 40 species
- The Urogenital Tract – about 50 species
- The Hands – nearly 200 species
- The Mouth – over 500 species
- The Digestive Tract – over 1000 species!

The Benefits

- Break down complex carbohydrates
- Synthesize vitamins
- Outcompete and essentially “crowd out” disease-causing bacteria
- Produce toxins that kill non-indigenous microbes
- Additional areas of research – may protect against some autoimmune diseases such as asthma, may play a role in weight loss/gain

Altering the Balance of the Ecosystem

- Several factors have been shifting the proportions of “good” to “bad” bacteria:
 1. Improved sanitation, “hygiene hypothesis”
 2. Over-prescription of antibiotics
 3. Antibacterial agents added to everyday products such as tissues, toothpaste, make-up
 4. Lifestyle changes – ex. decrease in breastfeeding, increase in Cesarean sections

So what does this mean?

The answer is, we don't know.

“We're seeing the equivalent of global warming in the human ecosystem.”

~ Dr. Martin J. Blaser, Professor of Microbiology and
Chairman of the Department of Medicine at New York
University

http://www.boston.com/news/science/articles/2008/02/25/of_microbes_and_men/

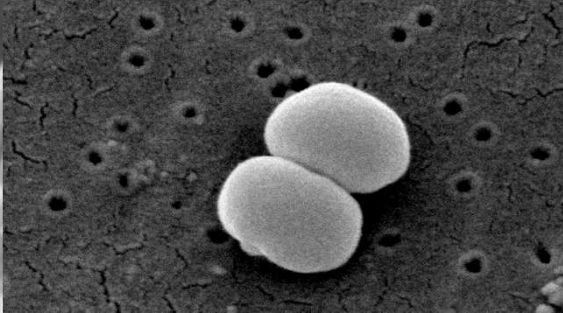
The Human Microbiome Project

- Initiated in 2008 by the National Institutes of Health
- Goals:
 1. Sequence over 1,000 bacteria found in and on the human body
 2. Determine which (if any) microbes people have in common
 3. Assess the relationship between these microbes and human health
- The human genome is about 20,000 genes but collective genomes of bacteria may have 3 million genes!

Your Task

- You will be working in groups of 2, 3, or 4.
- You will select one of the beneficial microbes on the next screen to research.
- You will present your findings in a very interesting format...let's take a look...

Beneficial Microbes



Staphylococcus epidermidis

http://upload.wikimedia.org/wikipedia/commons/5/5c/Staphylococcus_epidermidis_lores.jpg

- *Staphylococcus epidermidis*
- *Propionibacterium acnes*
- *Lactobacillus acidophilus*
- *Streptococcus mutans*
- *Oxalobacter formigenes*

- *Bifidobacteria bifidum*
- *Streptococcus pneumoniae*
- *Escherichia coli*
- *Helicobacter pylori*
- *Bacteroides thetaiotaomicron*



Lactobacillus Acidophilus

Sources

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- <http://www.scientificamerican.com/article.cfm?id=human-microbiome-change&print=true>
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