

Necrobiome: There Is No Death with Dignity

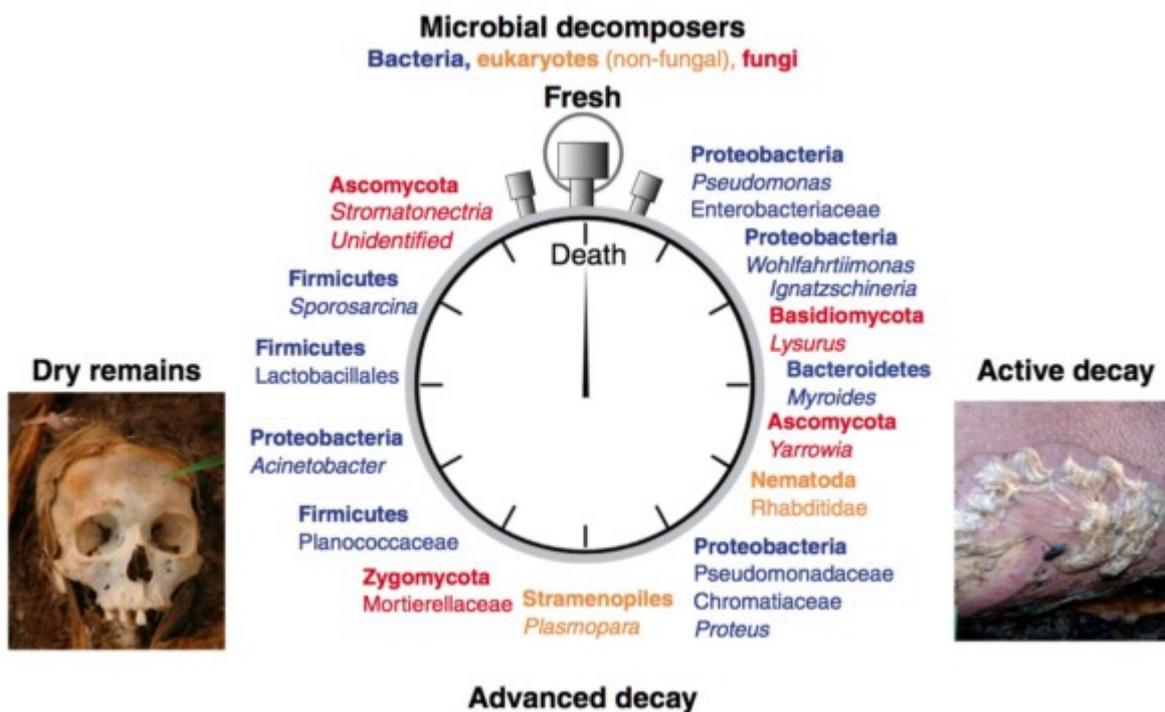


By Alex Berezow, PhD — July 17, 2016

What happens when we die? This question is both existential and biological. While scientists cannot address the first, they certainly can address the second. What happens to your body after you die is not pretty. Alas, there is no such thing as death with dignity when the microbial Grim Reaper arrives.

Decomposition can be roughly divided into five phases: fresh, bloat, active decay, advanced decay, and dry remains. (Images depicting a decomposing pig are at the bottom of this article. *Don't scroll all the way down if you are squeamish.*)

Dr. Jessica Metcalf of the University of Colorado has made a career studying the stages of decomposition as defined by the types of microbes that consume your body, which she terms the *necrobiome*. In her latest article, published in *Current Biology*, she and her colleagues identify the highly abundant microbes present as human decomposition progresses.



[1] *The shifting necrobiome*. Credit: Metcalf et al, *Curr Biol*, 2016.

Your rotting body essentially becomes its own miniature ecosystem that changes over time. In the words of the author:

"When a mammal dies its immune system shuts down, internal temperatures change, and internal bacteria begin to grow in ways impossible while under the

constraints of a living host. The internal environment then experiences another major event: rupture — a break in the skin that allows air, microbes, and insects to enter, and bodily fluids to exit. A carcass releases large amounts of nitrogen into the environment, mostly in the form of ammonia, as well as carbon, phosphorous, and other nutrients important for life. A dead body becomes a hotspot of nutrients, water, and ecological activity."

In an interview with ACSH, Dr. Metcalf notes that the microbes that consume your body come from within (e.g., from your gut) and without (e.g., from the soil and insects). Her data suggests that most of the decomposing microbes come from the soil. (Note that these studies are done on "body farms" where human corpses are allowed to decompose outside. Microbial samples are taken from the skin and soil.)

Let's take a closer look at some of the more interesting members of the necrobiome:

Pseudomonas. *Pseudomonas* is a ubiquitous soil bacterium. *P. aeruginosa* is metabolically diverse (i.e., it is able to eat a lot of different things, including you), is highly antibiotic resistant, and causes infections in people with cystic fibrosis or severe burns. [Research](#) [2] also suggests that *P. syringae* is involved in the formation of frost on plants or clouds in the sky.

Wohlfahrtiimonas and Ignatzschineria. These bacteria hitch a ride on blow flies. Blow flies eat your body and lay eggs that develop into maggots that also eat your body. (I warned you that there is no such thing as death with dignity.)

Lysurus and Yarrowia. These are among the first fungi to join the banquet.

Rhabditidae. Soon enough, the feasters become feasted upon. *Rhabditidae* are nematodes (microscopic worms) that eat bacteria. Worms and other non-fungal eukaryotes don't usually show up to the party if the corpse is indoors.

Acinetobacter. *Acinetobacter baumannii* has become infamous for infecting American soldiers in Iraq and Afghanistan. It is resistant to many antibiotics and [spreads easily in hospitals](#) [3].

Lactobacillales. This group of bacteria includes *Lactobacillus*, a genus of bacteria that is found in healthy women's vaginas and is also used to make cheese and yogurt.

But definitely don't think your rotting body will smell like yogurt. It most certainly will not.

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[Source](#) [1]: Jessica L. Metcalf, David O. Carter, Rob Knight. "Microbiology of death." *Curr Biol* 26 (13): pR561–R563. Published: 11 July 2016. DOI: 10.1016/j.cub.2016.03.042

Stages of decomposition



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Links

[1] [http://www.cell.com/current-biology/fulltext/S0960-9822\(16\)30252-4](http://www.cell.com/current-biology/fulltext/S0960-9822(16)30252-4)

[2] <http://www.scientificamerican.com/article/do-microbes-make-snow/>

[3] <http://labmed.oxfordjournals.org/content/41/11/649>

[4] <https://www.coursera.org/learn/microbiome/lecture/mGWH1/post-mortem-human-microbiome>