

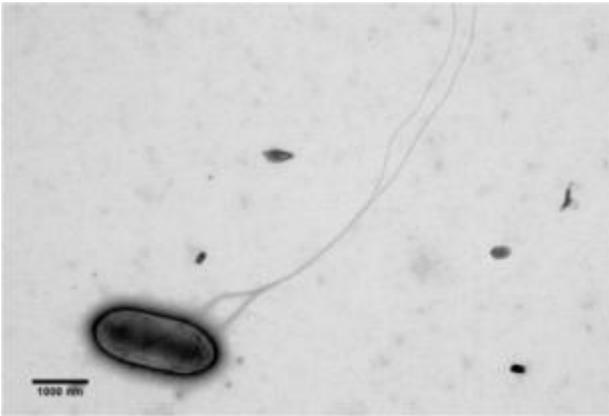


Published on *EnergyBoom* (<http://www.energyboom.com>)

[Home](#) > [Blogs](#) > [Leslie Berliant's blog](#) > The Little Microbe that Could...Power Your Home

The Little Microbe that Could...Power Your Home

By *Leslie Berliant*
Created 2009-08-06 10:40



Geobacter [1], an anaerobic sediment-loving microbe with hair like filaments called pili that are 20,000 times finer than a human hair, was discovered by Derek Lovley and some colleagues in sediment under the Potomac River in 1987.

It was thought to have application as a soil decontaminate for bioremediation [2] because it had the ability to respire iron and other metals, kind of like how people breathe oxygen. It also had another interesting ability; it could produce electricity from the organic matter found in soils, sediments and wastewater.

Last week, the University of Massachusetts Amherst announced [3] the development of a new strain of this super bacteria that can create even more energy from wastewater. The new strain of Geobacter was developed by Lovley and a team of researchers at the University to increase power output per cell and make it more efficient.

"In very short order we increased the power output by eight-fold, as a conservative estimate," says Lovley. "With this, we've broken through the plateau in power production that's been holding us back in recent years."

The next step for this super Geobacter is to design microbial fuel cells that convert wastewater and renewable biomass into electricity so that a home, for example, can convert its own waste into local electricity. It might also be used to power mobile electronics, vehicles and even implanted medical devices. Researchers say it can also play a role in the bioremediation of contaminated environments. Not bad for a little bacteria!

Here's how it works. Bacteria create biofilms to adhere to a surface near a food source, say your tooth for example. The biofilm the *Geobacter* creates is very good at transferring electrons to iron in soil and sediment and the long filaments, or pili, produce electric current from waste and sediment.

Lovley and his colleagues exploited that ability to breed *Geobacter* cells that increase those abilities even further. They grew *Geobacter* on a graphite electrode, as is usually done, providing acetate as food and allowing a colony to form the biofilm where electron transfer takes place across the pili. But they added a tiny, 400-millivolt "pushback" current in the electrode that forced *Geobacter* to press harder to get rid of its electrons. The result was the evolution of a beefed-up microorganism that can press at least eight times more electric current across the electrode than the original strain.

Microbial fuel cells [4], like those developed from *Geobacter*, consist of an electrode known as an anode that accepts electrons from microorganisms, and another electrode known as a cathode, which transfers electrons onto oxygen. Electrons flow between the anode and the cathode to provide the current that can be harvested to power electronic devices.

They are interesting on many levels, not the least of which is their ability to produce energy without combustion. Burning stuff works to create energy, but it is highly inefficient and doesn't work for every substance. Microbial fuel cells, on the other hand, have the potential to get energy from a number of waste products, and highly efficiently.

Lovley's work was supported by the Office of Naval Research and the U.S. Department of Energy and is described in more detail in the August issue of the journal, Biosensors and Bioelectronics [5].

[bioelectricity](#) [bioenergy](#) [bioremediation](#) [Derek Lovley](#) [Geobacter](#) [microbe](#) [Microbial Fuel Cells](#) [pili](#) [U.S Department of Energy](#) [University of Massachusetts Amherst](#) [electricity electronics](#) [energy](#) [food](#) [Bioelectronics](#) [bioremediation](#) [Biosensors](#) [Derek Lovley](#) [fuel cells](#) [Massachusetts](#) [U.S. Department of Energy](#) [University of Massachusetts](#)

Source URL: <http://www.energyboom.com/emerging/little-microbe-couldpower-your-home>

Links:

- [1] <http://www.geobacter.org>
- [2] <http://www.geobacter.org/research/bioremediation.html>
- [3] <http://www.umass.edu/newsoffice/storyarchive/articles/90975.php>
- [4] <http://www.microbialfuelcell.org>
- [5] <http://www.sensorsportal.com/HTML/Biosensors.htm>