

Getting the dirt on mud

AMHERST (AP) - There's something shocking going on in the mud. Millions of microscopic organisms are turning it into electricity. And University of Massachusetts microbiologist Derek Lovley says he's found a way to harness the energy.

Right now, Lovley and his team of researchers can squeeze enough electricity created by the muddy microbes to power a light bulb or handheld calculator. But with more research and development, Lovley says an energy powerhouse can rise out of the lowly muck.

All it takes for Lovley to demonstrate his point is a fish tank filled with sediment and water from Boston Harbor and two chunks of graphite the size of hockey pucks connected with copper wire.

With one graphite disk buried in the mud and another suspended in the water, Lovley and his research team created an electrical conductor that works like a battery.

That's where the microorganisms, called geobacters, come in. Visible only through a microscope, geobacters thrive in mud, Lovley said. They essentially "eat" the mud's organic material - such as plants, leaves and twigs - and release electrons.

Those electrons are lured to the buried graphite, then transferred through the wire to the other disk. The electrons increase the electrical current already flowing between the two the battery.

The microorganisms want to get rid of their electrons, and the graphite is helping them do it," said Lovley, whose findings are published in the Jan. 18 issue of the journal Science. "They create a constant output of energy and a continually renewed source of energy."

Lovley said the mud-powered batteries could power underwater electronic devices that monitor water temperature and movement.

"If you have a device that doesn't need battery replacement, you can save a lot of time, effort and money running it," he said.

But some scientists say there's one hitch: what happens when the geobacters eat all the mud that's around the battery?

"Theoretically, this sounds great, but I don't know how practical it is," said Caroline Harwood, a microbiologist at the University of Iowa. "The microbes are going to eat their food for as long as it's there. But they'll eventually run out of food."

Not to worry, Lovley says.

"I don't see that as being a problem," he said. "There's a lot of fuel for the microorganisms for quite a length of time."

Lovley's study, funded with a \$435,000 grant from the Office of Naval Research, also showed potential for environmental cleanup.

The geobacters eat the contaminants out of mud, and do it faster when they have a battery to dump their electrons on, Lovley said.

"We're at the very early stages of this," Lovley said. "We're shooting in the dark right now, just trying out a lot of things and understanding how this all works."

Harwood said there is potential in Lovley's work.

"It's not going to solve the world's energy problem, but it could be an additional weapon in the arsenal of ways to generate electricity," Harwood said. "There may be some specialized conditions where this can be just the ticket. But more work needs to be done."