

The Planet Protectors

There's more than one way to be an environmentalist. These forward thinkers are doing it one photo, one blouse and one microbe at a time

DEREK LOVLEY

The Massachusetts researcher with a beaker full of sediment containing *Geobacter*, microbes that can generate electricity as they break down pollutants

THE
MICROBE
MASTER

GETTING A CHARGE OUT OF MUD

CLEAN AND DRY IS NOT AN INTERESTING environment for Derek Lovley. As a boy, he always wanted to go where he might get wet. Growing up in northwest Connecticut, he worked summers as a lifeguard and briefly considered a career monitoring streams. So even though his work in environmental microbiology kept him indoors, when it was time to open his own lab in 1995, he chose to do so at the University of Massachusetts in pastoral

Amherst, turning down more prestigious Ivy League suitors so that he could have a better prospect of getting his boots muddy.

Lovley's dual pursuits of scientific exploration and natural surroundings led him straight to the discovery of a group of remarkable microbes he named *Geobacter*, which breathes rust instead of oxygen, thrives in polluted earth and can even generate electricity. When Lovley first found *Geobacter* in silt beneath the Potomac River in 1987, he had no idea how capable it was. "I never thought it would go this far," says Lovley. "But *Geobacter* can do so many things."

(Open gatefold to continue)

INNOVATORS

ENVIRONMENT FORGING THE FUTURE

(Continued from previous page)

Geobacter's secret is its unique metabolism: the microbes expel electrons outside their cell walls without needing to convert them to water, as human cells do. *Geobacter* needs only an outside compound—usually iron oxide, or rust—to accept the excess electrons. Lovley discovered how to coax *Geobacter* into not only dumping electrons onto uranium waste but also consuming petroleum by-products. *Geobacter* has already effectively decontaminated a uranium mine in Colorado and an oil spill in Minnesota.

But *Geobacter* has an even more remarkable talent. Just as the microbes can give electrons to iron, they will gladly donate them to an electrode, which creates an electrical current. Navy researchers first observed “electrified” sea muck in 2000. From this, Lovley’s lab has corralled *Geobacter* into sediment batteries that could be powering battlefield electronics within a year.

Lovley’s unyielding faith in the microbe’s potential, along with financial backing from the Department of Energy and the military think tank DARPA, has expanded his lab from five scientists to more than 50 today. Daniel Bond, who has won accolades for his work in Lovley’s lab, says his colleague’s creativity comes from an ability to straddle different disciplines in his work. Says Bond: “Derek really appreciates a good unsolved problem.” And the rest of us can appreciate Lovley’s ingenious answers. —By Nathan Thornburgh

Wearing of the Green

A lot of environmentalists work in bold strokes, saving a species or blocking a dam, but Christina Kim operates in a more subtle way. The fashion designer weaves an eco-friendly philosophy into all her creations. “I am less interested in some really grandiose idea of how I’m going to save the environment,” says Kim. “Ultimately, we have to look at how we spend one day.” Kim and her clothing-and-housewares company, Dosa, do a lot of little green things that add up. She will make fleece jackets and recycle the remnant material—even collecting other companies’ leftovers—as stuffing for poufs in her home-furnishings line. She has made a mission of promoting the “imperfect white”—keeping cotton its natural color, a creamy off-white, instead of using harmful chemical bleaches. “It’s more beautiful to wear different shades of white,” she says. When she colors her fabrics, she often dips them in natural dyes, such as indigo, cochineal (a scarlet pigment produced by a parasite that lives on cacti)

THE
ORGANIC
DESIGNER

CHRISTINA KIM

The Korean-born designer creates simple, airy pieces inspired by her travels. Fans include Jennifer Aniston, Julia Roberts and Nicole Kidman

BLAKE LITTLE FOR TIME

