

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Chemical and Biomolecular Engineering News
Releases

Chemical and Biomolecular Engineering
Departmental Papers

2-1-2006

Discover Magazine - Cyborg Bacteria

Ravi F. Saraf

University of Nebraska-Lincoln, rsaraf2@unl.edu

Vikas Berry

University of Nebraska-Lincoln, vberry2@unlnotes.unl.edu

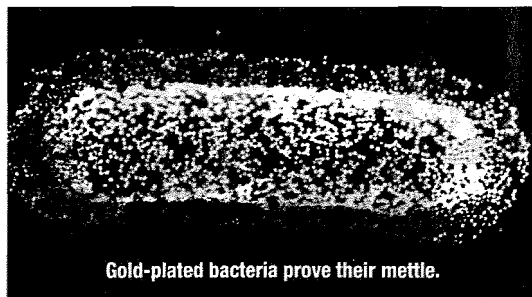
Follow this and additional works at: https://digitalcommons.unl.edu/chemeng_news

 Part of the [Chemical Engineering Commons](#)

Saraf, Ravi F. and Berry, Vikas, "Discover Magazine - Cyborg Bacteria" (2006). *Chemical and Biomolecular Engineering News Releases*. 4.

https://digitalcommons.unl.edu/chemeng_news/4

This Article is brought to you for free and open access by the Chemical and Biomolecular Engineering Departmental Papers at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Chemical and Biomolecular Engineering News Releases by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.



Gold-plated bacteria prove their mettle.

Building a Better World With Cyborg Bacteria

In a society that has gold-plated everything from hub-caps to teeth, it was perhaps inevitable that someone would find a way to add some bling to bacteria. **Chemical engineers Ravi Saraf and Vikas Berry of the University of Nebraska at Lincoln** have embedded bacteria with microscopic gold particles, creating the world's first living electronic circuit.

The initial generation of microscopic cyborgs perform a useful task: They can take very precise measurements of humidity. As the bacterial cells absorb water from the air, they expand, pushing the gold particles

apart and making it more difficult for electricity to flow through the circuit. This effect allows researchers to detect changes in humidity as small as 0.1 percent.

The next step is to use microbes to create biological transistors, which could detect small amounts of pathogens or deadly chemicals. Eventually Saraf hopes to use metal-coated microorganisms to control the flow of electricity through logic circuits, which could form the basis of a robotic brain that learns to recognize obstacles or to distinguish industrial pollutants from a chemical attack. —Zach Zorich

Breathe Easy, You've Got Intestinal Worms

It's hard to believe that there's an upside to parasitic worms, but statistics indicate that people who are infested have lower rates of asthma and allergies. A group of Scottish biologists has figured out why.

Rick Maizels at the University of Edinburgh and his colleagues find that the worms manipulate their hosts into producing cells called regulatory T cells, which calm the immune system. "The parasite, far its own benefit, exploits these regulatory cells so that the immune system isn't able to expel it," he says, "but a side effect is that it also dampens the allergic response." With the immune system mellowed, the host's reaction to other foreign objects such as dust mites or dander is much milder. In type 1 diabetes, the body attacks its own cells in the pancreas, limiting their ability to produce insulin; the intestinal worms would most likely clamp down on the immune response behind this process as well. With the hope of developing new treatments, the Scottish team is trying to find the specific molecule from the worms that encourages the formation of regulatory T cells. —Elise Kleeman

Foundations of Christianity Unearthed

Conventional wisdom says early Christians scurried around an underground network of private homes and clandestine sites to avoid being thrown to the lions until Roman emperor Constantine legalized the religion in A.D. 313. But a 30-by-15-foot mosaic floor—all that remains of what may be one of the oldest churches ever found—suggests Christians were better tolerated than most people thought.

Mosaic fish symbols and references to a table donated for "the God Jesus Christ" firmly identify the building, located near Megiddo, Israel, as a place of Christian worship. Although the age of the structure hasn't been verified, epigrapher Leah Di Segni of the Hebrew University of Jerusalem says that the phrasing and the lettering style of the inscriptions support the idea that the church predates Roman approval. Moreover, the use of a fish motif rather than a cross, which became the dominant Christian symbol under Constantine, also

suggests the building is older, according to Yotam Tepper, the Israeli Antiquities Authority archaeologist who led the excavation.

The most puzzling aspect of the find is an inscription identifying a Roman military man named Gaianos as the donor who paid for the mosaics—either a suicidal gesture of generosity in a time when the practice of Christianity carried the death penalty, or an indication that the church was built during a period of relative open-mindedness. If so, this tolerance was probably short-lived. Smashed wine jugs and shards of wall frescoes scattered over the floor led Tepper to speculate that the church was deliberately destroyed.

If the early Christians were right, it won't be the last time the church is demolished. The name "Megiddo" was later corrupted into "Armageddon"—the site, they believed, of the final showdown between good and evil just before the end of the world. —Zach Zorich



The mosaic floor from a third-century church (above) displays early Christian iconography. It was found during an excavation (right) for the expansion of an Israeli prison.



PHOTOMICROGRAPH COURTESY OF RAVI SARAF, VIKAS BERRY, AND FRANK F. WANDT, CHEMISTRY, UNIVERSITY OF NEBRASKA AT LINCOLN. PHOTOGRAPHS: INSET, ARIEL SCHALITZAP; PHOTO: MOSAI, COURTESY OF THE ISRAELI ANTIQUITIES AUTHORITY.

PHOTOGRAPH BY DAVID PRINCE/FOODPIX.