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## The Dirt on Curing Clays

Larry O'Hanlon, Discovery News

**Oct. 25, 2007** -- Someday your doctor may be prescribing you dirt, if new research into a few potent anti-bacterial clays is successful.

Plenty of clays are already on the market, touted as cures for various ailments, but few have any clinical data to back them up. That began to change five years ago when the late French humanitarian worker Line Brunet de Coursou reported that a French clay called Agricur was proving effective against the flesh-eating disease Buruli ulcer in Ivory Coast, Africa.

Now an interdisciplinary team of microbiologists and mineralogists is trying to figure out exactly how the clay cures.

"They would mix clay with water and make a paste and put it on the horrible wounds," explained clay mineral researcher Lynda Williams of Arizona State University. When daily applications of the clay caused too much pain and appeared not to help, another French clay was used.

"It was the second clay that killed (the bacteria), although the clays are mineralogically identical," Williams told Discovery News.

That's where Williams and colleagues such as microbiologist Shelley Haydel were able to begin NIH-supported research into what made one clay toxic to [bacteria](#) and the other harmless. The first results of their work will be presented on Oct. 28 at the meeting of the [Geological Society of America](#) in Denver.

"We're not just buying this healing stuff," said Williams of the popular and unproven use of all sorts of clays for questionable medical purposes. "We're trying to understand."

The researchers used several different clays, including sterile sand and the French clay used in Ivory Coast, to see how well they killed a broad spectrum of bacteria. Several different kinds of well-known, dangerous bacteria -- *Salmonella typhimurium*, *Streptococcus sp.*, *Escherichia coli* and *Pseudomonas stutzeri* -- were exposed to the clays.

"We found that bacterial cultures lost 90 to 99 percent of viability within 24 hours of exposure to the French Agricur clays," reports [U.S. Geological Survey](#) researcher David Metge, who collaborated with Williams, Haydel and others. "These results contrasted to only 10 to 40 percent of reduced viability caused by other clays or sterile sand."

The trick now, of course, is figuring out exactly how the clay is killing the microorganisms, said

Williams. One possibility is that metals in the clay are the active ingredients. Or it could be that the highly charged molecular surfaces of the clay minerals tear up bacterial cells.

Either way, clays would likely be a lot harder for bacteria to evolve defenses against, as is happening with the accidental breeding of "super bugs" by the overuse of antibiotics and antibacterial products.

Unlike antibiotics, clay minerals almost certainly kill bacteria by a physical, not biochemical, process, explained mineralogist Ross Giese of the State University of New York in Buffalo, who is not directly involved in Williams' project.

Once the mechanism behind the killer clays is figured out, the research could lead to cheaper treatments for Buruli ulcer and other diseases. The [World Health Organization](#) (WHO), recently labeled Buruli ulcer an emerging public health threat. The disfiguring disease is increasingly common among children in central and western Africa.

If one of the Buruli's rural victims is fortunate enough to get medical help, the infected tissue is generally cut out, which sometimes means amputation. There is no other WHO-approved treatment.

On the other hand, clay therapy is reported to have cured more than 50 cases of Buruli ulcer to date, the team reports.

"It not only stops the infection, but allows the body to regenerate tissues," said Giese.

"The Holy Grail in all this is if you could figure this out, it opens up a whole new world of fighting pathogenic bacteria," said Giese.

Clays have long been used for stomachaches, paper processing, sealing wells and other applications. But the long history of bogus clay cures and the fact that clay has such lowly origins has made clay research proposals a hard sell to funding agencies, Giese said.

"The previous uses have been low-tech," said Giese. Clay particles are truly nature's own nanotechnology, he asserts. "I think that if clay was not synonymous with mud and dirt, we would be much further along."

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