A New Way to Dispose of Corpses—With Chemistry!

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Alkaline hydrolysis is a clean, green method for dissolving a body into its chemical building blocks; the runny remains just wash down the drain.

BY HAYLEY CAMPBELL

THE RESOMATOR STANDS monolithic in the corner of a room on the ground floor of a building at UCLA. It's as sterile as a hospital in here, but every patient is already dead. This is the penultimate stage of their time under the care of Dean Fisher, director of the Donated Body Program at the UCLA David Geffen School of Medicine. After dissection, bodies are wheeled in under crisp sheets for disposal in Fisher's alkaline hydrolysis machine, which turns them into liquid and pure white bone. Later, their

disperse, because pure calcium phosphate dissolves very slowly. From a Coast Guard helicopter, it looks like drug lords flushing their stash.

The machine is mid-cycle, emitting a low hum like a lawnmower several gardens away. It's a rectangular box as big as a van, and its stainless steel panels neatly hide pipes, a panel of flashing lights and fuses, and the cylindrical tank that holds the body. All that's visible from the outside is a touchscreen and four lit-up buttons: three green, one red. Bodies enter through the same kind of circular steel door that Britain's defense ministry uses on nuclear submarines.

Fisher explains what's happening inside the high-pressure chamber: Potassium hydroxide is being mixed with water heated to 302 degrees Fahrenheit. A biochemical reaction is taking place, and the flesh is dissolving off the bones. In the course of about four hours, the strong alkaline base breaks down everything but the skeleton into the original components that built it: sugar, salts, peptides, and amino acids. DNA unzips into its nucleobases—cytosine, guanine, adenine, thymine. The body becomes a sterile watery liquid that looks like weak tea. The liquid shoots through a pipe into a holding tank in the opposite corner of the room, where it will cool, reach an acceptable pH, and be released down the drain.

Fisher, gray-haired and beaming in light-green scrubs, says I can step outside if it all gets to be too much, but it's not actually that terrible. The

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NIK MIRUS

CREMATION AND BURIAL, the most common ways that bodies are disposed of after death, haven't fundamentally changed in quite some time. The modern act of embalming, popularized during the American Civil War, is a physically violent one in which blood goes down the drain, untreated, after being pushed out by embalming fluid pumped through the vascular system. Full of dyed-pink carcinogenic formaldehyde and other chemicals, the body is put in the ground, where its decomposition is delayed, but not entirely so. The chemicals seep out as the corpse putrefies, along with any drugs that were present at the time of death. In the US alone, more than 800,000 gallons of embalming fluid are buried every year.

In 2015, the popularity of cremation fractionally outpaced burial in the US for the first time in history—but few ask what it entails. They don't know

ensure the whole body is touched by flame. They don't know that, despite the best efforts of crematory operators, bone dust catches in the bricks of the retort (the chamber in which the deceased is burned); cross-contamination of bodies is inevitable. Instead of chemicals leaking out into the soil, they end up in the clouds.

Alkaline hydrolysis avoids all that. It was conceived in the mid-'90s to solve Albany Medical College's problem of research rabbit disposal—the bodies were radioactive and therefore could not be burned or buried affordably—and in 2003 Minnesota became the first US state to allow its use on human remains. (The business of body disposal is highly regulated at the state level, and authorities are generally wary of novelty.) In the years since, a growing number of independent funeral homes have added alkaline hydrolysis to their list of services, and last October, California became one of a dozen or so states to legalize it. Jack Ingraham, CEO of Qico, a San Diego startup that's joined the two established players in the field—the UK's Resomation (creator of Fisher's machine) and Bio-Response Solutions in Indiana—expects Utah to be next, with more states to follow as awareness spreads and demand grows. "Our goal is that, in 10 or 20 years, the term 'cremation' will be thought of entirely as a water-based process," he says.

One obstacle to wider-spread adoption: Big Funeral needs to back it, and according to Fisher, who was a funeral director before working in body

International, Carriage, Stewart Enterprises—have set up billion-dollar models to sell you a casket, give you a ride to the cemetery in that hearse, sell you the cemetery plot, and put up the marker." Alkaline hydrolysis doesn't require any of that.

The alkaline hydrolysis machine turns cadavers into liquid and pure white bone. SPENCER LOWELL

BACK AT UCLA, a muffled dual-tone alarm sounds in a cupboard. Fisher opens it to show me a tiny implantable defibrillator, the batteries of which have been running down for years. "It's been through the machine and the battery's still working. Crazy, isn't it?"

On a small blue towel, below buckets of teeth and fillings (teeth are separated from bones—metal fillings aren't biodegradable and could break the cremulator in which the bones are ground into powder), is a collection of metal hip joints, valves, stents that propped open the chambers of hearts, pins, plates: things that remain on the tray after the flesh around them has disappeared. The process is gentle enough to render a hernia mesh as new as the day the surgeon implanted it, but strong enough to bleach the color out of glass eyes and fake fingernails.

refiners goes toward an annual memorial service for all donor patients as well as the servicing of the machine; he says it ends up paying for its own upkeep. He flips a pacemaker over and holds it in front of my face. “If you look at all this, you can still read the label. You can’t put these in a crematory. You have to cut them out.”

> In a crematory retort, prosthetics melt or burn or, in the case of a pacemaker’s lthium-ion battery, explode. Titanium ball-and-socket hip joints don’t come out polished like a pristine mirror as they do in Fisher’s cupboard, they come out battered with carbon. The silicon breast implant that Fisher jiggles in his hand (“We call them jellyfish”) has already spent a good few years inside a woman and four hours inside the machine, but would melt like gum in a crematory. Other implants, like plastic urinary pessaries or penile pumps, would never even be seen by a crematory worker. They melt and escape into the atmosphere through the chimney along with the mercury in your teeth.

me press the red button to open the door, and Alex Rodriguez, Fisher's right-hand man, swings it open. There on the tray, amid steam, lies the skeleton of a 90-year-old woman who donated her body to the medical school. Rodriguez delicately picks up the larger bones and places them in a tray. As he does so, he tells me what he knows about her from her bones alone: that she had no teeth when she died, because there are none here. That she had osteoporosis, which turns your bones to dust before the cremulator. That she was small.

If you're interested in donating your body one day, Fisher will explain alkaline hydrolysis to you personally. He'll stand you in front of this silver machine and tell you exactly how it works. And later, he will slide you in, quickly and quietly turning your body back into the biological blocks that built you.

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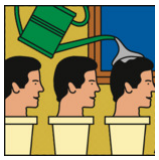

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