

## **How scientists are altering DNA to genetically engineer new life forms**

### **Health/Science**

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**Scientists are altering our genetic code and engineering new forms of material that improve nature, from flowers that can detect bombs to bacteria that secretes fuel.**

BY [BRYAN WALSH](#) for Newsweek on June 29, 2017 Before human beings wrote books or did math or composed music, we made leather. There is evidence hunter-gatherers were wearing clothes crafted from animal skins hundreds of thousands of years ago, while in 2010 archaeologists digging in Armenia found what they believed to be the world's oldest leather shoe, dating back to 3,500 B.C. (It was about a women's size 7.) For a species sadly bereft of protective fur, being able to turn the skin of cows or sheep or pigs into clothing with the help of curing and tanning would have been a lifesaving advance, just like other vital discoveries Homo sapiens made over the course of history: the development of grain crops like wheat, the domestication of food animals like chickens, even the all-important art of fermentation. In each case, human beings took something raw from the natural world—a plant, an animal, a microbe—and with the ingenuity that has enabled us to dominate this planet, turned it into a product. The natural world has its limits, though. Tanned animal skin may make for stylish boots, motorcycle jackets and handbags—supporting an industry worth about \$200 billion a year—but it's still animal skin. That would seem to be an insurmountable problem if you're one of the hundreds of millions of vegetarians around the world, or even just someone who worries about the environmental impact of raising tens of billions of animals for clothing and food. But it's not the animal skin that makes leather leather—it's collagen, a tough, fibrous protein that is a major biological component of animal connective tissue, including skin. If there was a way to manufacture collagen alone, it might be possible to produce leather that even the most dedicated animal-rights activist could love. And that's exactly what's happening on the eighth floor of the cavernous Brooklyn Army Terminal on New York's waterfront, where Modern Meadow has its labs and offices. There, the 60-person startup takes tiny microbes and [edits their DNA](#)—the genetic code that programs their behavior—so they will yield collagen as a metabolic product, just as the yeast that brew beer create alcohol from grain sugar. The result is a microbiological factory, as the tweaked cells multiply in vats and the harvested collagen is processed. After a tanning procedure—one more sustainable than that used in standard tanning, since there is no animal hair or fat to remove from the microbe-grown collagen—what's left is a material that is biologically and chemically similar to conventional leather, save chiefly for the fact that no animals were harmed in its making. In fact, this biofabricated leather may be better than animal leather—Modern Meadow's microbes can produce collagen much faster than it would take to raise a cow or sheep from birth, and the company can work with brands to design entirely new materials from the cell level up. "It's biology meets engineering," says Andras Forgacs, the co-founder and CEO of Modern Meadow. "We diverge from what nature does, and we can design it and engineer it to be anything we want." [&hellip;]

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