CRISPR 2.0

How Mammoth is chasing CRISPR 2.0 with a smaller pair of scissors

With a set of 'ultra-compact' CRISPR proteins, the startup built a COVID-19 test and wants to be a platform for finding and treating any disease.

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[Images: Mammoth, Reagent]

BY ALEX PANTSERNAK

This article is about one of the honorees of Fast Company's *Next Big Things in Tech awards for 2022. Read about all the winners here.*

In 2006, Trevor Martin, a biology Ph.D. at Stanford, was growing restless. He'd fallen in love with synthetic biology, where discoveries were being made weekly, but was frustrated with the lab's distance from real-world applications. And among the new discoveries, nothing was as tantalizing as CRISPR, a genetic tool found in bacteria and other organisms that researchers were using to effectively cut and paste DNA. If anything in a lab could help people—with anything from detecting and treating cancer to curing genetic diseases to building climate-resilient agriculture—this was it.

"Being able to reproducibly and reliably change the code of life, DNA and RNA, has been historically so incredibly difficult," he says. "If we can program biology the same way we program a computer, that's transformative."

He'd been intrigued by a new paper from the lab of UC Berkeley professor Jennifer Doudna, whose pioneering research on CRISPR had been making waves, so he sent her an email. To his amazement, she responded. Martin connected with two of her star grad students, Janice Chen and Lucas Harrington, who were researching newer versions of CRISPR, including one that reported on the presence of targeted genes. In 2017, the four of them launched Mammoth Biosciences in a small lab in San Francisco's Dogpatch neighborhood, with the aim of turning CRISPR's pair of molecular scissors to a whole suite of apps. "We can leverage the great foundation that's been built and take CRISPR to the next level," says Martin.

Trevor Martin (Photo: Mammoth)

The goal is to build a CRISPR "platform" for the masses, including a diagnostic "search engine" for disease, and permanent cures for those diseases, by eliminating or actually changing the genetic mutations behind them. Now 190 people large, the company has since expanded to a glassy headquarters in the south of San Francisco, and has raised $195 million from investors including Alphabet's Verily, Amazon, Gail Boudding CEO Jeff Huber and Apple's Tim Cook, valuing the company at over a billion dollars. Mammoth "will be completely unignorable in terms of the transformative impact it can have on patients' lives," Martin, now Mammoth's CEO, says matter-of-factly.

GETTING CRISPR IN THE BODY, AND BEYOND THE LIVER

In just a decade, CRISPR has rewritten the paths of a generation of scientists, sent dozens of companies on a gold rush, sparked a dramatic patent battle, and earned Doudna and her collaborator, Emmanuelle Charpentier, the 2020 Nobel Prize. Clinical trials, meanwhile, have shown promising results for using CRISPR to cure blood disorders such as sickle cell anemia. Researchers have begun applying CRISPR to develop cures for any number of ailments: cancer, congenital blindness, AIDS, type 2 diabetes, maybe even neurological disorders like Huntington's disease.

The technology is also finding uses beyond sick patients: making tweaks to plants in order to help them adapt to a changing climate; helping bodies accept lab-grown organs; curing malaria in mosquitoes, which could eliminate the disease in humans. There are more thrilling and risky prospects too, like germline genome editing to build disease-resistant children in the future, or using CRISPR to [illegible] the world's microbiomes.

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