4 innovations—including stronger gene-editing skills—that would allow us to rewrite genomes from the ground up

The ability to read genomes has transformed our understanding of biology. Being able to write them would give us unprecedented control over the fabric of life.

…

Here are the four areas where we need to step up our game.

[Genome Design:] Large-scale genome design will require computer programs that can do this accurately and efficiently.
….

[DNA Synthesis:] Large-scale genome engineering will require much faster, cheaper, and more efficient methods for DNA assembly. One nearer-term possibility is designing new enzymes that can reduce the number of errors.
…

[Genome Editing:] While our gene-editing prowess has come a long way, we still struggle to make widespread changes to a genome simultaneously. If we could develop this capability, it could significantly decrease the amount of time it takes to modify organisms.
…

[Chromosome Construction:] Most efforts so far have relied on yeast to do this for us, and it has been able to deal with viral, bacterial, yeast, and algal chromosomes, as well as fragments of mice and human genomes. But engineering more specialized artificial chromosomes looks to be beyond yeast, so we need to find newer, more flexible organisms that can do this.

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