

Just under a year ago, a molecular-biology technique was thrust onto the world stage. Researchers in China announced that they had used the nascent gene-editing tool CRISPR–Cas9 to modify the genomes of human embryos, triggering a major ethics debate.

Yet while this controversy has been playing out, researchers the world over have rushed to use the tool to tinker with the genomes of other human cells, viruses, bacteria, animals and plants, and it's in these contexts that the technique promises to have more-immediate impact. This issue of *Nature* examines what's going on at the CRISPR frontiers.

Biologists are using CRISPR–Cas9 to better understand genomes — not just by editing DNA, but by devising variations on the technique to precisely manipulate the activity of genes (see page 156). And, armed for the first time with a method that can easily introduce genetic changes to many animals, researchers have edited a veritable menagerie of beasts — from ferrets to elephants to koi carp (see page 160) — in an attempt to combat disease, improve agriculture and even make designer pets.

Such advances in gene editing are creating

upheaval for the regulatory bodies that are responsible for approving genetically engineered products — it's a “powder keg waiting to explode”, writes Jennifer Kuzma, a science-policy researcher at North Carolina State University in Raleigh, on page 165. She calls for more openness and honesty than has characterized past discussions of biotechnology, and for a regulatory system that better factors in societal views as well as science.

CRISPR–Cas9 may be democratizing gene editing in the laboratory, but Todd Kuiken, who studies science policy at the Wilson Center, a think tank in Washington DC, argues on page 167 that the revolution has not yet swept into home workshops or citizen-science community spaces. Contrary to reports in the popular media, he says, few CRISPR creations are likely to come from the labs of do-it-yourself biologists any time soon. However, this group is arguably ahead of the scientific establishment when it comes to thinking about how to use the technology safely.

For better or for worse, CRISPR–Cas9 is transforming biology. We are now at the dawn of the gene-editing age. ■



EVERYWHERE

A special issue explores what it means to be living in an age of gene editing.

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