CRISPR Technology

Excellent Narrated, Animated Introductory Video: (7 minutes)

https://www.youtube.com/watch?v=MnYppmstxIs

McGovern institute animated video (very basic/introductory: Genome Editing with CRISPR)

https://www.youtube.com/watch?t=141&v=2pp17E4E-O8 (4-minutes)

Jennifer A. Doudna, PhD – her own story and ethical questions

https://www.youtube.com/watch?v=TdBAHexVYzc (TED Talks: 10 minutes + 5 discussions)

Simple Description:

CRISPR, a new genome editing tool, is transforming the field of biochemistry.

CRISPR allows scientists to edit genomes with unprecedented precision, efficiency, and flexibility. The past few years have seen a flurry of "firsts" with CRISPR, from creating monkeys with targeted mutations to preventing HIV infection in human cells. In early 2016, Chinese scientists announced they applied the technique to nonviable human embryos, hinting at CRISPR's potential to cure any genetic disease. In short, CRISPR is much better than older techniques for gene splicing and editing.

CRISPR is actually a naturally-occurring, ancient defense mechanism found in a wide range of bacteria. As far as back the 1980s, scientists observed a strange pattern in some bacterial genomes. One DNA sequence would be repeated over and over again, with unique "spacer" sequences in between the repeats. They called this odd configuration "clustered regularly interspaced short palindromic repeats," or CRISPR.

This was all puzzling until scientists discovered that the unique sequences in between the repeats matched the DNA of viruses—specifically viruses that prey on bacteria. It turns out that the spacer sequences are actually copies of segments of dangerous viruses' DNA so it can recognize and defend against those viruses next time they attack. The second part of the defense mechanism is a set of enzymes called Cas (CRISPR-associated proteins), which can precisely snip DNA as directed by RNA transcripts of the spacers.

There are a number Cas enzymes, but the best known is called Cas9 from *Streptococcus pyogenes*. Together, they form the CRISPR/Cas9 system, though it's often shortened to just CRISPR. Jennifer A. Doudna at Berkely was the first to apply this bacterial protection system to cut up DNA for other applications. She and her colleagues made synthetic RNA probes and combined them with Cas9 to cut DNA at any location they desired. While Cas9 slices DNA with a blunt end, new Cas enzymes have been discovered that slice DNA like a restriction enzyme, leaving sticky ends… ripe for genetic engineering.

It could, for example, be used to introduce genes that slowly kill off the mosquitos spreading malaria. Or genes that put the brakes on invasive species like weeds. It could be the next great leap in conserving or enhancing our environment—opening up a whole new box of risks and rewards.

http://gizmodo.com/everything-you-need-to-know-about-crispr-the-new-tool-1702114381