CRISPR-Cas9 Catapults Mankind Into The Eugenics Age

jefferymyersunleashed.io/eugenics_age

According archaeological records, scientist believe that mankind began using tools about 600,000 to 700,000 years ago. This period was called the

“Pleistocene, or Glacial, Epoch”

and marked the beginning of the Stone Age. The Bronze Age, Iron Age, and Stone Age compromise the “three-age” system. This period of human development saw mankind grow to harness raw materials to produce complex machinery.

Around 1760, power driven machines began to replace hand- and animal-powered tools. The use of powered machinery enabled mass production and large scale exploitation of natural resources. This was the beginning of the Industrial Age.

On July 16, 1945, American scientists assigned to the Manhattan Project detonated the first atomic bomb. The weapon was code named: TRINITY. This event ushered in the Atomic Age.

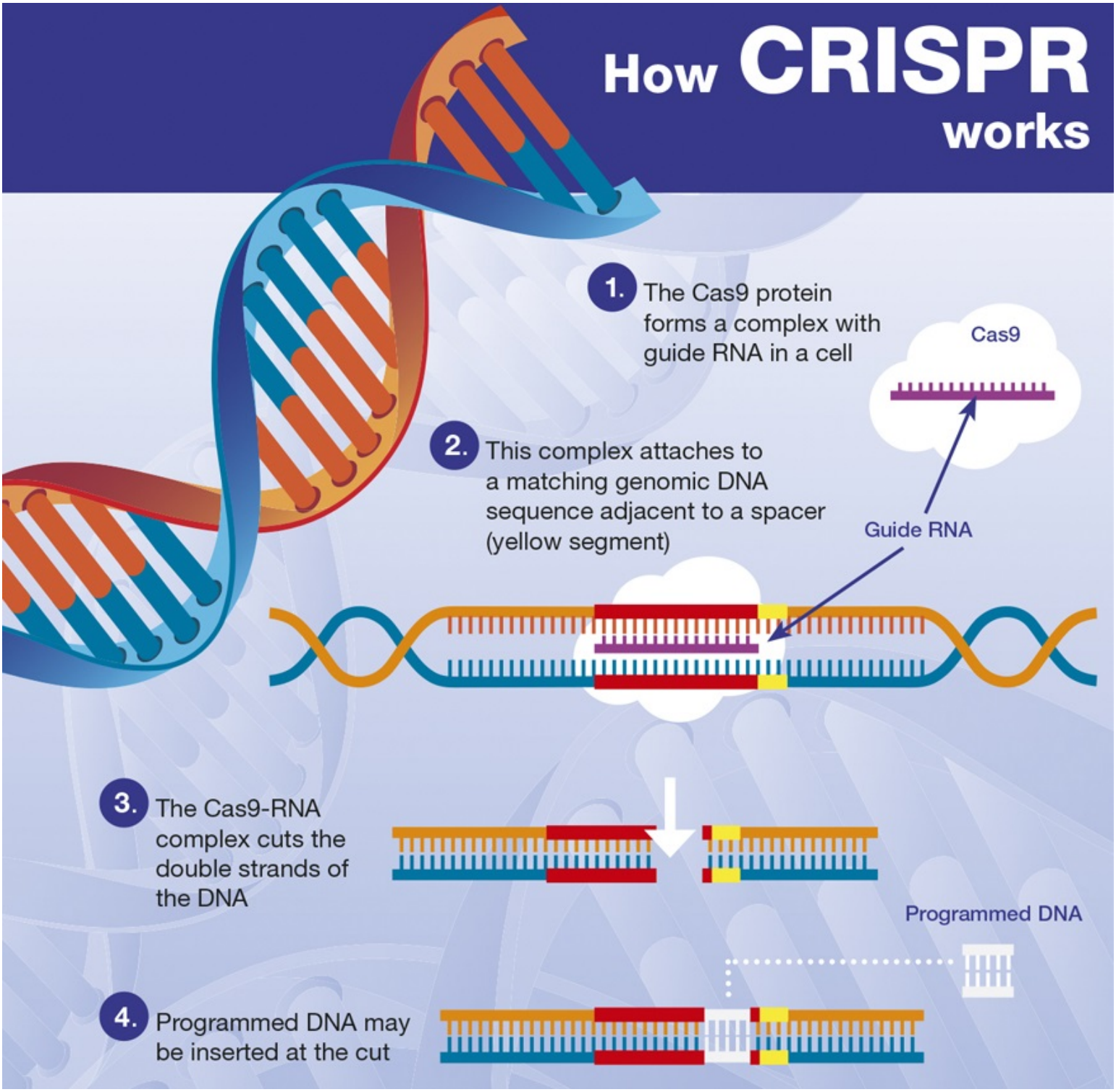
In the late 1960, and early 1970s, the first microprocessors were developed and mass produced. These devices formed the core of the first generation of digital computing devices. This period marked the beginning of the Digital Age.

In August 1981, Microsoft released the Disk Operating System (MS-DOS). This closed-source operating system provided the interface by which users could deliver instructions to the microprocessor. The Disk Operating System bridged the gap between human-readable instructions and machine language coding. DOS also provided drivers which allowed peripheral devices like printers to connect to and communicate with microprocessor. The text-based, command line, DOS interface soon gave way to a graphical "point-and-click, drag-and-drop" means buy which users could deliver instructions to the microprocessor and connected peripheral devices. Programmers would soon write applications that ran atop the operating system. These applications consumed and produced ever increasing amounts of data. Hardware abstraction, virtualization, and cloud computing technologies emerged in order to handle exponential growth in data. This was the beginning of the Information Age.

On August 17, 2012, two teams of researchers lead by Jennifer A. Doudna, Ph.D., University of California, Berkeley and Emmanuelle Charpentier, Ph.D., Max Planck Institute for Infection Biology, respectively published a paper entitled,

> ***"A Programmable Dual-RNA–Guided DNA Endonuclease in Adaptive Bacterial Immunity."***

In the paper Professors Doudna and Charpentier, respectively, describe the molecular mechanisms bacteria employ to defend themselves from viruses. Researchers had discovered the immune system of some of the tiniest living organisms in existence.



Researchers learned that bacteria stored copies or "sequences" of DNA from invading virus. These sequences of viral DNA were stored as "spacers" in an RNA molecule called a **CRISPR** or **Clustered Regularly Interspaced Short Palindromic Repeats**.

Researchers simplified the bacteria's active immunity mechanism in the lab. The CRISPR-Cas9 features two components:

1) The **guide RNA** molecule, and

2) The **Cas9 "cutting" protein**.

These two components are bound together to create a

> “complex.”

A synthesized RNA molecule, known as guide RNA, is coded to locate specific segments in double stranded DNA sequences. At the specified location, the guide RNA “unwinds” the targeted DNA sequence. The guide RNA binds to the invading DNA strand. The Cas9 protein cuts, or “knocks out” the sequence of the double stranded DNA molecule to which the guide RNA is bound.

CRISPR-Cas9 allows researchers to insert another DNA sequence into the location of the knock out. This results in a desired DNA mutation.

> “Now geneticists have a very precise not to mention extraordinarily cheap and easy to use tool which can locate, cut, deactivate, activate or rewrite any sequence of DNA that they want in a living cell.”

The hacking of computers has given way to the hacking of living organisms. **The Eugenics Age has arrived.**

CRISPR-Cas9 enables geneticists to target and edit individual genes, a genetic sequence, or an entire chromosome. Genetic modifications using CRISPR-Cas9 are analogous to using a word processor to correct a typographical error, delete a word, or insert an entire sentence. Geneticists can activate or deactivate specific genes. With CRISPR-Cas9, geneticists can make genetic modifications to an organism

> “in vitro”

or in the laboratory. Genetic changes can also be made

> “in vivo”

or to living beings.

CRISPR-Cas9 is being called the biggest scientific breakthrough since the atom was harnessed to produce energy. Just like atomic energy, CRISPR-Cas9 “gene editing” holds great promise. In the wrong hands, this technological breakthrough poses a great peril to the entire human race.

THE PROMISE

CRISPR-Cas9 holds enormous promise. The gene editing system provides geneticists with the ability to correct or eliminate a wide range of diseases and abnormalities. For example,

> "...researchers from Temple University managed to eliminate HIV-1 DNA from T cell genomes in human lab cultures, and when these cells were later exposed to the virus,they were protected from reinfection."

There was great excitement over this result within the HIV/AIDS research community.

This is welcomed news for the African American community where HIV/AIDS rages at epidemic rates. A recent study by the Centers for Disease Control revealed that

> "..gay and bisexual black men have a 1 in 2 risk of [HIV positive] diagnosis, while Hispanic men have a 1 in 4 risk and white men have a 1 in 11 risk."

Additionally,

> "...despite other studies showing black people do not engage in more risky sexual behavior compared to other racial or ethnic groups. The racial difference in risk extends to women as well, with 1 in 48 black women likely to be diagnosed with HIV in their lifetime, compared to 1 in 227 Hispanic women and 1 in 880 white women."

...AND THE PERIL

All roads to the cure for diseases and genetic abnormalities involve experimentation on human embryos. Herein lies great peril in the use of CRISPR-Cas9. One faction of geneticists oppose the use of CRISPR-Cas9 on human embryos. Another faction supports limited use of human embryos in genetic engineering experimentation. Still other groups press forward with gene editing of human embryos in laboratories around the world including China.

> “Modifying human embryos is legal in China and in many US states.”

> “Chinese scientists have already used the new technology to edit the genomes of human embryos, raising the specter of genetically altered humans and the genetically altered progeny they’d produce.”

There are four (4) main, and compelling, reasons that CRISPR-Cas9 gene editing of human embryos is being discouraged, and in some countries, is outlawed:

1) Off-Target mutations,

2) DIY Accessibility,

3) Germline mutation,

4) Gene drive.

"OFF TARGET" MUTATIONS

“Off Target” mutations pose a major concern. When CRISPR-Cas9 is deployed, it will locate and modify the target gene or sequence. However, scientist have discovered that other segments of the genome of animals, or even human, may match the sequence they initially targeted for mutation. The potential hazard is that RNA can cause mutations at OTHER unintended locations along the double stranded DNA helix. These “Off Target” mutations are highly unpredictable and nearly impossible to predict.

> “These enzymes will cut in places other than the places you have designed them to cut, and that has lots of implications,”

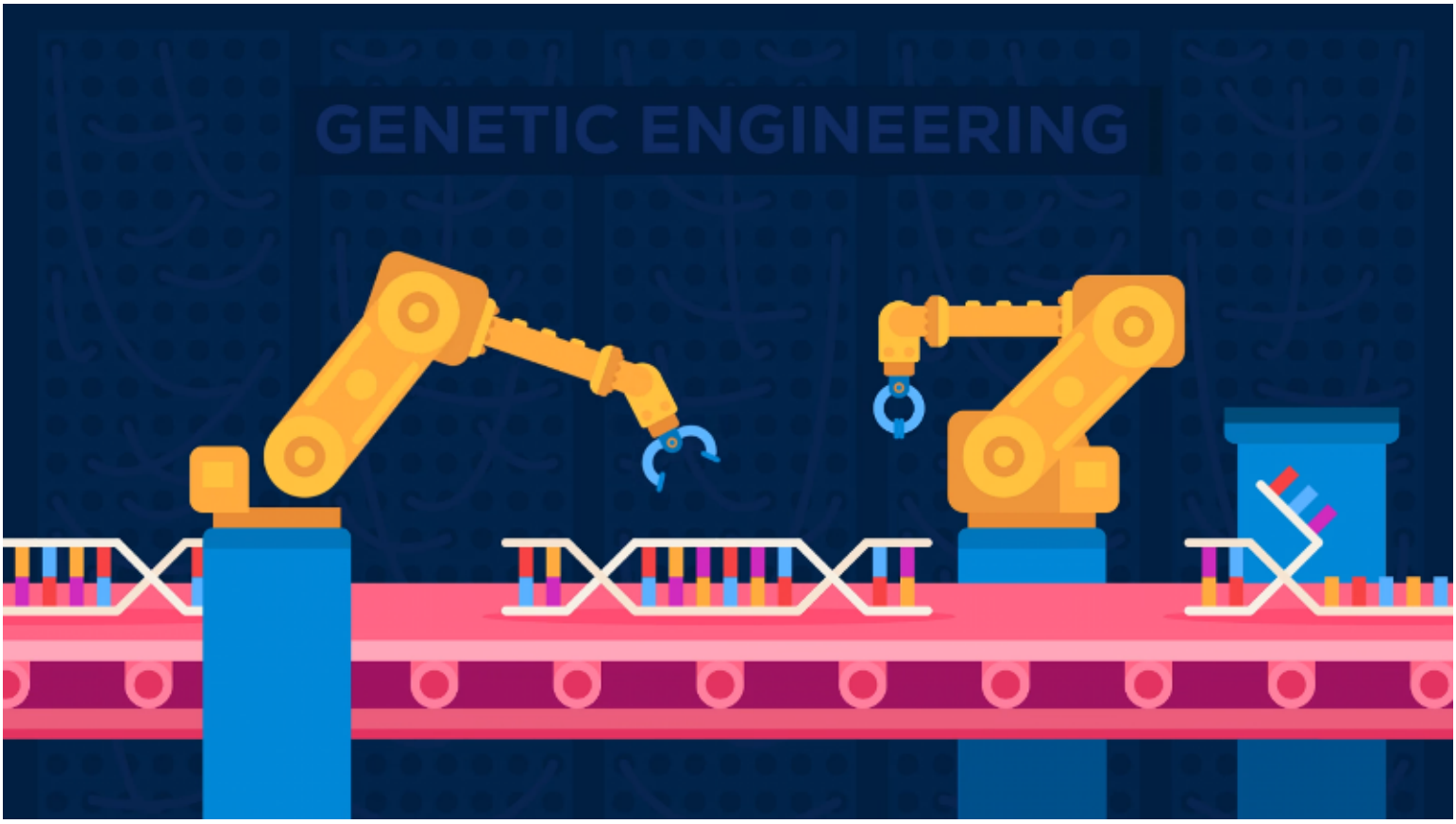
says Haber.

> “If you're going to replace somebody's sickle-cell gene in a stem cell, you're going to be asked, 'Well, what other damage might you have done at other sites in the genome?'”

Chinese geneticists at Sun Yat-sen University performed CRISPR-Cas9 gene-editing on

> 'non-viable'

human embryos. Their research was part of an effort to modify the gene associated with a potentially fatal blood disorder.



The research team led by Junjiu Huang reported that

> "...a surprising number of 'off-target' mutations assumed to be introduced by the CRISPR/Cas9 complex acting on other parts of the genome."

The researchers went on to report that

> "..their results reveal serious obstacles to using the method in medical applications."

Concerns notwithstanding,

> "There are also suspicions that scientists have already created human embryos with edited genomes."

DO IT YOURSELF (DIY) BIOENGINEERING

CRISPR-Cas9 places powerful genetic engineering tools within the reach of ANYONE! A Doctorate in genetics IS NOT REQUIRED. All you need is a few dollars, some spare time, and the willingness to handle samples of lethal bacteria that's been labeled as

> "non-pathogenic."

Yes, that's all you need. You too can play Frankenstein in the comfort, at least for now, of your own home genetics laboratory.

> “This power is so easily accessible by labs — you don't need a very expensive piece of equipment and people don't need to get many years of training to do this,”

says Stanley Qi, a systems biologist at Stanford University in California.

> “CRISPR works differently: it relies on an enzyme called Cas9 that uses a guide RNA molecule to home in on its target DNA, then edits the DNA to disrupt genes or insert desired sequences. Researchers often need to order only the RNA fragment; the other components can be bought off the shelf. Total cost: as little as $30.”

> “CRISPR takes a fraction of the time,...”

of previous gene editing methods and procedures.

> “But Doudna has begun to have more serious concerns about safety. Her worries began at a meeting in 2014, when she saw a postdoc present work in which a virus was engineered to carry the CRISPR components into mice. The mice breathed in the virus, allowing the CRISPR system to engineer mutations and create a model for human lung cancer4. Doudna got a chill; a minor mistake in the design of the guide RNA could result in a CRISPR that worked in human lungs as well.”

Jennifer Doudna is one of the scientist credited with the development of CRISPR-Cas9.

> “The ubiquitous access to and simplicity of creating CRISPRs,”

says Lanphier, whose company applies gene-editing techniques to adult human cells,

> “creates opportunities for scientists in any part of the world to do any kind of experiments they want.”

Kits now are available via mail order. In the rush to apply it, many “researchers” do not fully appreciate the danger and potential negative consequence. Samples of potentially lethal pathogens are included in many of these mail order CRISPR-Cas9 kits.

Writing in Scientific American, author Annie Sneed remarked,

> "..everything I needed came in a small cardboard box—an assortment of bottles, tubes, plates, powders and liquids (plus*E. coli*).."

The

> "DIY Bacterial Gene Engineering CRISPR Kit"

allows the buyer to genetically modify E. coli to become resistance to the commonly used antibiotic streptomycin. Antibiotic resistant strains of bacteria represent one of the greatest challenges to hospitals. What if someone's DIY experimentation with E.Coli results in "Off Target" mutations of the bacteria's genome? What if those mutations result in a new, more virulent and deadly form of the bacteria?

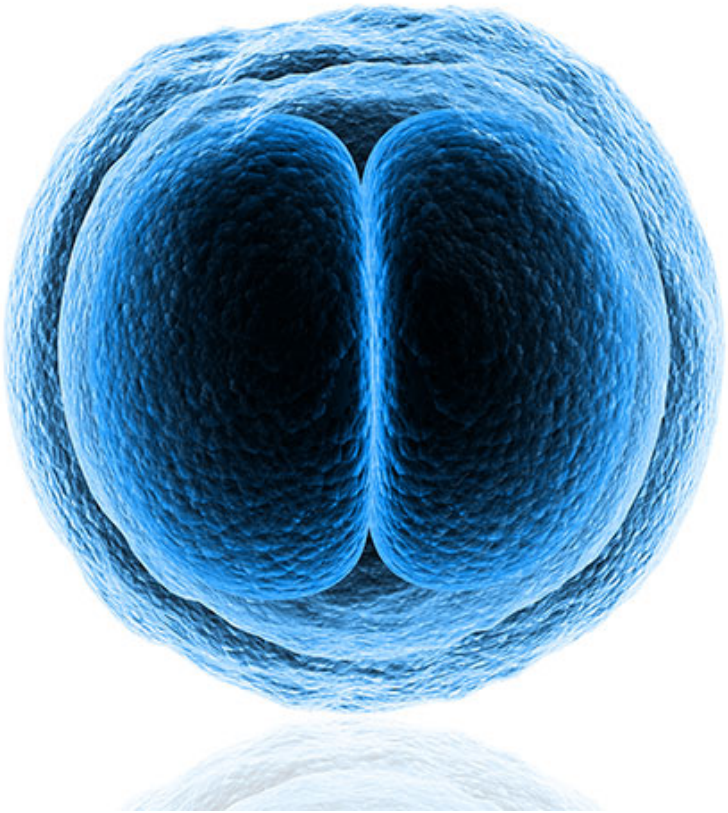
Could drug traffickers use DIY CRISPR-Cas9 kits to genetically engineer super strains of highly addictive "mutant" marijuana and poppy plants? Could terrorist groups use these DIY kits to genetically engineer highly lethal strains of anthrax? The possibilities and the perils are limited only by the imagination.

GERMLINE MUTATIONS

“Germline” are mutations capable of propagating to successive generations. Germline modifications are also referred to as

> "inheritable genetic modifications."

In other words, the effort to cure one patient’s sickle cell anemia could introduce genetic modifications to their offspring (and beyond). These genetic mutations could prove to be more devastating than the original disease.



Unethical or immoral uses of CRISPR-Cas9 can result in changes to an individual or an entire group of people without their knowledge or consent. These genetic modifications would be irreversible.

> “Known as germline modification, edits to embryos, eggs or sperm are of particular concern because a person created using such cells would have had their genetic make-up changed without consent, and would permanently pass down that change to future generations.”

Edward Lanphier, chairman of the Alliance for Regenerative Medicine, stated

> “We need a halt on anything that approaches germline editing in human embryos,”

Germline modifications of the human genome are

> “...heritable, they could have an unpredictable effect on future generations. “

Germline modifications could be used for genocidal purposes. Ethicists and futurists fear that CRISPR-Cas9 could be weaponized to spread a lethal, or at least harmful, and irreversible genetic mutation through generations of a target group.

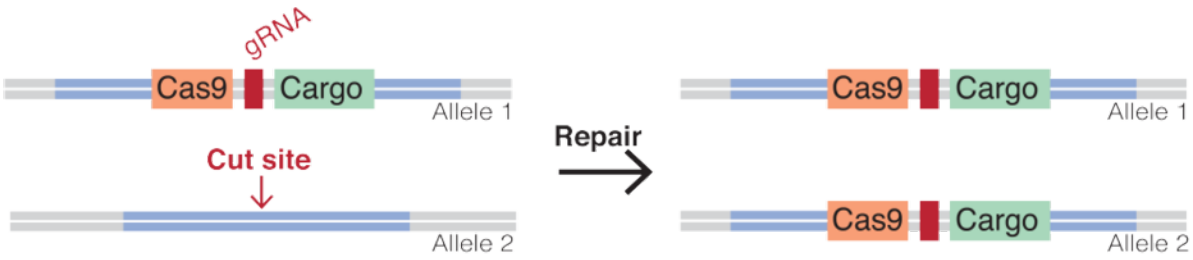
GENE DRIVE

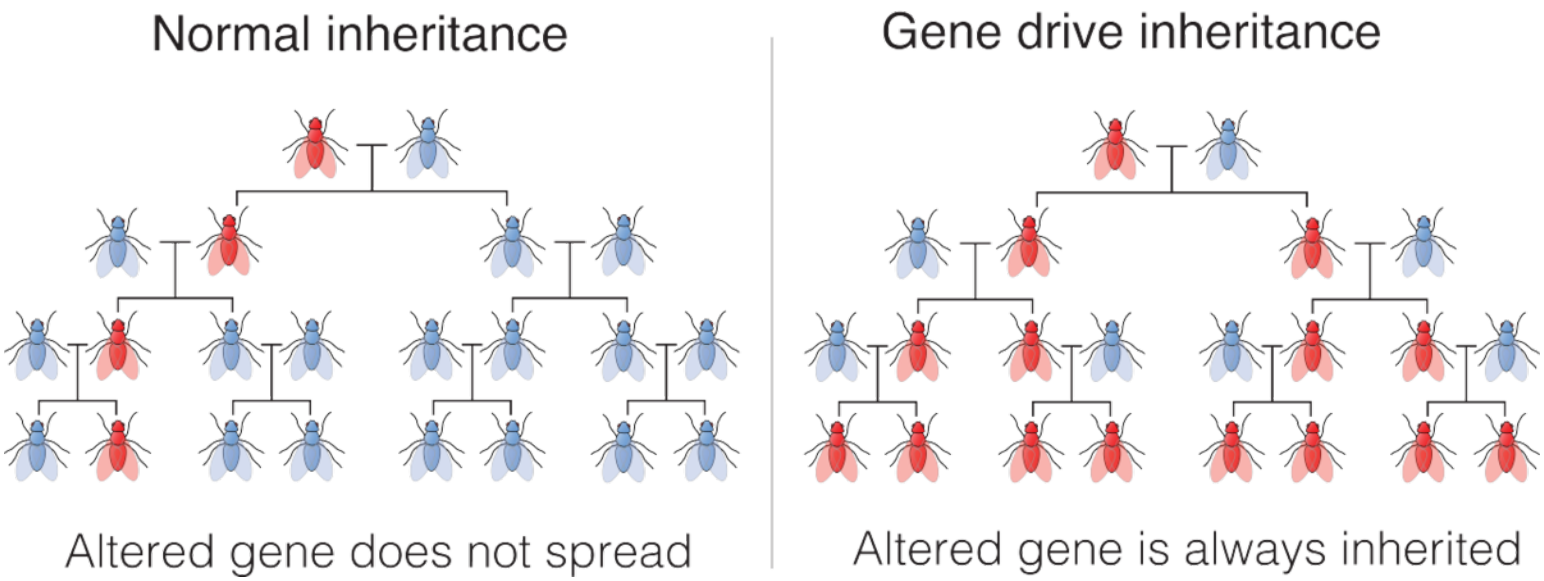
Genetic mutations occur in nature. They typically work their way slowly through a population sometimes over the course of millions of years. Gene Drive can accelerate mutations through a population in the matter of a few generations.

> "Crispr-Cas9 has the potential to genetically alter entire groups of humans or animals."

Gene drive can cause

> "[mutations] that can "speed through a population exponentially faster than normal,..."





> "But a gene drive allows a mutation made by CRISPR on one chromosome to copy itself to its partner in every generation, so that nearly all offspring will inherit the change. This means that it will speed through a population exponentially faster than normal…."

In the wrong hands, CRISPR-Cas9 could be used to spread lethal genetic mutation to a target population. This kind of capability has been the "Holy Grail" of the eugenics movement for more than a century.

> “But many researchers are deeply worried that altering an entire population, or eliminating it altogether, could have drastic and unknown consequences for an ecosystem: it might mean that other pests emerge, for example, or it could affect predators higher up the food chain. And researchers are also mindful that a guide RNA could mutate over time such that it targets a different part of the genome. This mutation could then race through the population, with unpredictable effects.”

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