

The Y chromosome is disappearing, so what will happen to men?



There's consensus in the scientific community that the Y chromosome is deteriorating. The Y chromosome in the reproductive process comes from the male and is the determining factor in creating a male baby. So, what happens if the Y chromosome is in decline? Does it mean there will be fewer men on the planet, and does this have implications for our species and its survival?

XX and XY

In humans, as well as many other mammals, females have two X chromosomes, and men have one X and one Y chromosome.

Chromosomes

Looking at human biology at its most basic, we can break it down like this: in the nucleus (control center) of a human cell, each DNA molecule is packed into a long thread called a chromosome. Most human cells contain 23 pairs of chromosomes, with half of these coming from each parent. There are 22 pairs of "autosomes," while the last (23rd) pair are the sex chromosomes.

Y chromosome

A symbol of masculinity, the Y chromosome is determined paternally. The sex of humans and other mammals depends on the gene passed on by the male.

Deterioration

However, it appears the Y chromosome is deteriorating at an alarming rate, and in a few million years it could disappear completely.



Evolve or become extinct

Unless we evolve to produce a new sex gene, the degeneration of the Y chromosome could eventually lead to our extinction as a human race.

OR JUST FIGURE OUT WHAT SCIENTIFIC FACTORS LIE AT THE HEART OF THIS DECLINE, AND COMMIT TO REVERSING IT.

BUT WOKE CULTURE DOESN'T SEEM TO CARE, OR BE INTERESTED IN A CURE...



Gene function

The X chromosome contains around 900 genes that do all kinds of jobs. In comparison, the Y chromosome contains about 55 genes, as well as repetitive DNA that doesn't seem to have a function. However, the Y chromosome remains important. It contains a gene that's responsible for starting male development in the embryo. This is because the Y chromosome contains the SRY gene, which acts as a "master switch" for the development of human testes (male gonads).



Conception

Around 12 weeks after conception, these genes turn on to make male hormones (testosterone and its other derivatives), ensuring the baby develops as a boy.

Identification

The SRY gene and its action was first identified in 1990. It was discovered that it triggers a genetic pathway beginning with something called the SOX9 gene, which determines the male sex in all vertebrates.



A fundamental flaw

In the early days of our species, the Y chromosome was the same size as the X chromosome, and it contained all the same genes. However, it seems that Y chromosomes have a fundamental flaw. Other chromosomes have two copies in each cell, allowing genes to recombine and lose harmful mutations.

Father to son

Y chromosomes are only ever present as a single copy, passed on from fathers to their sons. This means that the

"shuffling" of genes doesn't happen from one generation to another.

Degeneration

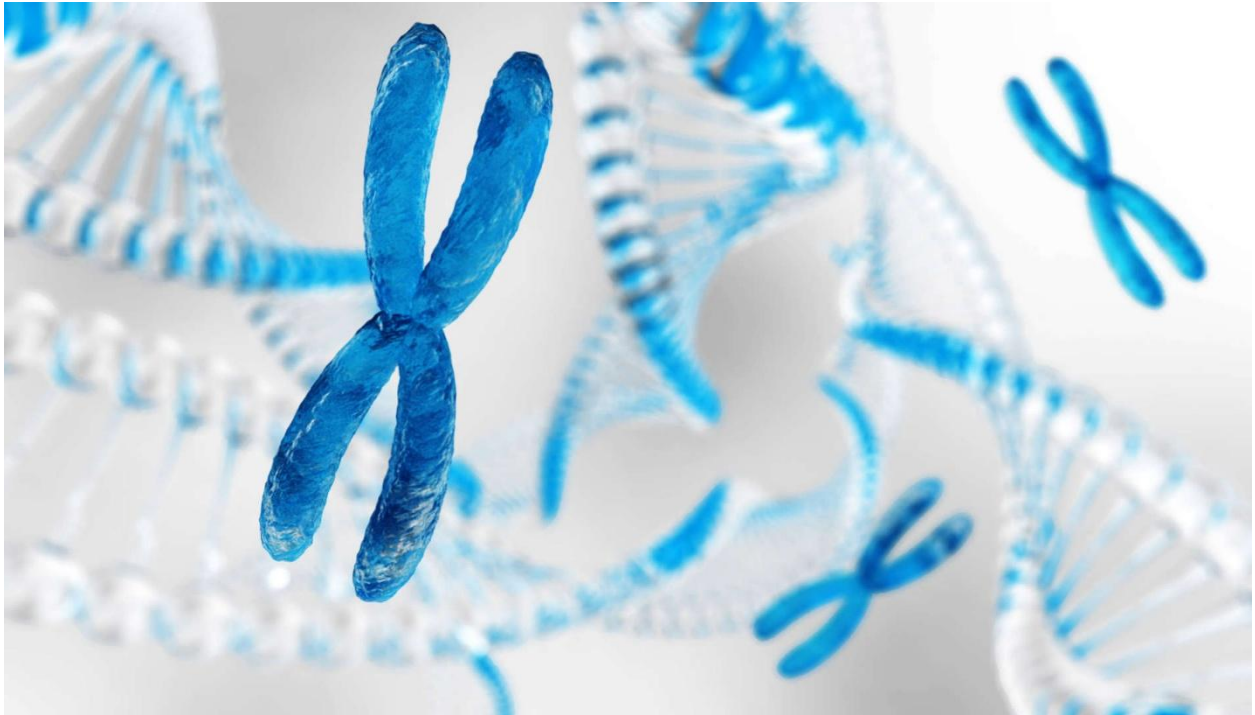
Without the benefits of recombination, Y chromosomal genes degenerate over time and are eventually lost from the genome.



Slowing gene loss

Despite this, it appears the Y chromosome has some mechanisms to slow down the rate of gene loss. One Danish

study sequenced the Y chromosome from 62 men and found interesting results.



Gene amplification

The results showed the Y chromosome is prone to large-scale, structural rearrangements, allowing for something called "gene amplification."



Gene amplification

This amplification allows the Y chromosome to acquire multiple copies of genes that promote healthy gametes and mitigate gene loss. This amplification allows the Y chromosome to acquire multiple copies of genes that promote healthy gametes and mitigate gene loss.



Palindromes

What's more, it appears the Y chromosome has developed things called "palindromes"—sequences that read the same forwards as well as backwards. These palindromes protect the gene from degrading further. Researchers recorded a high rate of "gene conversion events" within palindromic sequences.

Gene conversion events

These events are a copy and paste process within the gene. They allow for damaged genes to be repaired using an undamaged copy as a template.

Disappearance

Whether the Y chromosome will disappear or not is a matter of debate in the scientific community. Some feel the mutations taking place are enough to save it, while others argue its demise is inevitable.

Adaptation in nature

There is some good news, however: it's already happened to the male vole in Eastern Europe and the spiny rat in Japan, and they've adapted. These rodents have developed a new male-determining gene in an evolutionary response to the decline of the Y chromosome.

Good news

The good news is that even if the Y chromosome does eventually die out, it doesn't necessarily mean men themselves will disappear.

Normal human reproduction

Even if the Y chromosome did disappear, males and females are both still necessary for human reproduction.



Assisted reproduction

Interestingly, many of the genes the Y chromosome carries are not necessary when you use assisted reproduction methods.



Genetic engineering

This could mean that genetic engineering could be used to find a replacement to the function of the Y chromosome. If this happened, it could allow same-sex couples or infertile men to conceive.

Natural reproduction

However, even if this became possible, it's unlikely humans would one day collectively decide to stop reproducing naturally.

We just don't know

Right now, it's uncertain that the Y chromosome will disappear at all. And even if it does, we have a few million years to figure it out!

