

EDITORIAL - MAY 16, 2020

# “Whole societies were shaped by mutations”



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*The following editorial has been adapted from an online lecture series by Dr. Jessica Park*

## Mutantology 101 – What is a mutant?

OK class settle down. Today we are going to learn about a topic important to our society: mutants and mutation.

About 10% of women and 1% of men in our society are what we call mutants. But what is a mutant, you ask?

You may remember from biology class that “mutation” refers to when your genetic code changes for some reason. It could be due to radiation, interaction with a virus, or just random chance as cells split and divide.

And while it is true that “mutants” as we have come to know them are genetic mutants, that doesn’t actually tell us much. In reality, most humans are mutants, in scientific terms. Are you colorblind? That’s a mutation. Bald? That’s also a mutation. Do you have red hair, green eyes, or freckles? Those are all mutations passed down from generation to generation, aberrations in the human genetic code that create all new traits.

Heck, if you can eat cheese and drink milk, you are a mutant. Biologically, mammals are supposed to stop eating dairy before they reach adolescence, but some humans have evolved an altered trait that allows them to continue to produce lactase, the milk digesting enzyme, far into adulthood. In a way, you can say whole societies were shaped by mutations like this.

But if so many people are mutants, why is there such a difference between one person with green eyes and another with three heads, six breasts, four arms, four legs and a tail? Well that’s because mutants, as we know them, are not just genetic mutants. They are epigenetic mutants!

## **Mutantology 102 – What is epigenetics?**

You all learned about DNA in biology, but here's a refresher. It's the genetic code that rests in the nucleus of our cells that makes up who we are. Every living thing has DNA, from trees, to rabbits, to humans like us. Our cells each have a complex bit of chemical machinery that reads from our DNA to code for proteins. Those proteins are then used to build more cells, and those new cells are then used to become everything in our body, from bones to organs, to our muscles and skin.

However, that's only a partial explanation. The human genome consists of three billion base DNA pairs, but only about 1% of them are ever actually read! Yes, all that is you is created by just a fraction of your DNA. What's the rest? Well, we call it "junk" DNA, as a whole, but it comes from a lot of places. Some of it was only used once when you formed as a baby. Some of it is leftover genetic instructions from your ancestors that were apes, fish, or even single-celled organisms. Some of it is leftover from viral infections. In fact, your DNA still holds evidence of infections your ancestors got millions of years ago.

But what all junk DNA has in common is that your body never does anything with it. It just sits there, doing nothing, for basically all of your life.

And that 1% of DNA that makes up who you are? Not all of it gets used either. This is where epigenetics comes in. Epigenetics is the study of how and why our genes get expressed. While your genetic code is determined by your parents, that same code can manifest in many different ways due to epigenetics. Have you ever seen identical twins, but one was a bit taller, or a bit more muscular? These changes are due to epigenetics.

What's important to note is that epigenetic changes are not pre-determined by your genetic code. If you work out, your body will start reading genes for muscle growth that it wouldn't necessarily have read before. If you are stressed, your body will read genes that will raise your adrenaline and, unfortunately, put strain on your heart. Epigenetic shifts are caused by environment as much as they are caused by biology and, in fact, there can be epigenetic consequences far down a genetic line. If you have asthma, allergies, or a mental illness like chronic depression or anxiety, it may be the result of epigenetic changes caused by how your great great great grandparents lived.

But being slightly taller or more muscular is still very different than, say, growing hooves and an udder. What could cause an epigenetic shift so great that it creates mutants as we know them?

For that, we have to talk about pointer genes.

## **Mutantology 103 – Pointer genes**

Your genetic code is a series of instructions that explains how your body works. It determines how you grow, how you fight off disease, even how you breathe and think. More importantly, it also contains instructions on how to be read.

This is where pointer genes or "boundary" genes come in. These are genes that tell your chemical machinery what other genes to read and what to do with them. They "point" to the parts of your genetic code that are usable, and create "boundaries" that prevent junk DNA from being read. It's this system of pointer and boundary genes that keeps humans looking and acting, well, human.

In our society, you can get tested to figure out whether or not you have the “mutant gene.” What we are actually doing with those tests is reading all your pointer genes. You are considered to have the mutant gene if your pointer genes are pointing to, well, the wrong places. This allow parts of your junk DNA to be read when they shouldn't, or prevents certain parts of your normal non-junk DNA from being read. Sometimes it causes whole sections of your genetic code to be replaced with junk DNA.

In short, anyone who has the “mutant gene” has pointer genes that allow much more of their DNA to be read than the standard 1% of non-mutants.

## **Mutantology 201 – Activating mutations**

Not everyone who has the mutant gene becomes a “mutant.” In fact, while 10% of women and 1% of men are mutants, it's estimated that about 30% of both women and men have the mutant gene. Why is this the case?

To get the answer we once again turn to epigenetics. You can have the mutant gene your entire life and yet never mutate because your genetic machinery never reads anything other than the standard DNA it would have normally read. To actually start reading junk DNA, your genetic machinery needs to have a reason to start reading some other part of your DNA, which means your body's internal chemistry needs to change somehow.

It's not entirely clear what chemical processes contribute to these epigenetic shifts. We know as little about the causes for them in mutants as we do in humans. It's still a growing field of biological study, but there are some patterns we have seen.

Some mutants are simply born with their mutations. Whatever criteria was needed to alter their body chemistry happened while they were developing, or perhaps were due to lifestyles of their ancestors. For this reason, many scientists believe that “spontaneous” mutation is actually a result of life choices made by your parents, grandparents, great grandparents, and so on. Perhaps with further study, we can find exactly what life choices can increase the chance of having mutant offspring down the line.

Then there are natural changes in body chemistry, such as puberty, the transition to adulthood, menopause, and so forth. These chemical changes can, once again, cause an epigenetic shift that might bring on a mutation. This is why so many mutants report their first mutations during puberty.

Finally there are outside factors, most of which correspond with the same things that might cause a standard genetic mutation. Exposure to radiation might cause an epigenetic shift over time.

Coming in contact with a new strain of DNA might cause your body's genetic chemistry to see it, copy it, and search for something similar in your own junk DNA. This is one of the reasons we see “animal” style mutants.

Your DNA also determines where you end and other substances begin. Some scientists believe that fusions happen because two people with the mutant gene have at least a portion of their DNA that is so similar, their body can't tell the difference, and so they start growing into each other.

But it's not always that complicated. Remember, simple things like stress, changing a daily routine, working out or not working out, and so on can cause epigenetic shifts in humans. For those with the mutant gene, it's just that these shifts can be more drastic.

There are scientists all around the world studying what causes these epigenetic shifts, and just what kinds of mutations they cause. One of the leading labs is Access Labs. We tried to get an interview with Access to talk about his work, but for some reason he was unavailable for comment.

## **Mutantology 202 – Mutation and your immune system**

It's easy to think that anyone with the mutant gene that somehow encounters a trigger for an epigenetic shift will become a mutant, but that's not true either. In fact, all of you, even those who have the mutant gene, are undergoing epigenetic shifts, and even more drastic mutations all the time!

So why aren't you all walking around on eight legs? Because of our immune system.

You see, mutations occur in a lot of ways. Many cellular mutations just cause the cell to die. Many epigenetic shifts create cells that won't be able to communicate with the other cells of the body. Every mutation has to start with a single cell.

But if this single cell does anything that could harm the body, the body's immune system kicks in and fights it off like an infection. Your white blood cells puncture, eat, and dismantle any harmful mutated cells, and attempt to prevent such mutations again. This is how your body defends itself from things like cancer.

But out of thousands upon thousands of tiny mutations, one might be recognized as neutral or beneficial to the body's immune system. In these cases, your body treats the mutation simply like another phase of its growth. Sometimes it's slow, sometimes it's quick, and of course it can bring with it pain or other sensations, but the end product is something the body does not look at as invasive.

That being said, our bodies are not perfect. Mutations can still cause medical complications, which is why mutants are required to go through several medical checkups after a mutation. It's also why we all can get checked for the mutant gene any time we get blood taken, and why people who might be in danger of undergoing a spontaneous mutation are sometimes put under observation in a hospital. Slow mutations are usually not very dangerous but fast mutations require a lot of matter and energy to be moved around by the body all at once, and that could put incredible strain your organs. This is why some people who are preparing to mutate are prescribed nutrient dense food supplements.

Simply speaking, each mutation brings with it new opportunities for study. We still don't completely understand how mutant bodies work, and which mutations might be dangerous or painful, but we are learning more and more each day.

## **Mutantology 203 – The gender divide**

So why is it that there are more female mutants than male mutants? Once again I'd like to point you toward the reason for mutations as we know them, epigenetic shifts caused by body chemistry.

There is something about male body chemistry that seems to inhibit these epigenetic shifts. It's not entirely clear what. It's also not perfect. As I said before, 1% of the male population is what we consider mutants, so there is a chance that you mutant girls will hook up with a hot mutant boy someday.

Many scientists theorize that it's actually something hormonal, or possibly something to do with brain chemistry. You see, it's not just the biological female sex that mutates. Trans women, intersex women, women you might consider as "futa," and all other sorts of women have the same rate of mutation as normal cisgendered women. Similarly, trans men i.e. men who are biologically female but mentally and hormonally male have the same low rate of mutation as cisgendered men. So whatever is causing these epigenetic shifts is something unique to female biology, that isn't unique to female biological sex, but rather female gender. This, once again is why leading scientists theorize it has something to do with hormones or brain chemistry.

One thing that is clear, is that it has nothing to do with the genetic code. As we said before, 30% of men and women have the mutant gene, it's just that 10% of women and 1% of men ever express it.

### **Mutantology 301 – Mutant classifications**

We classify mutants into four types, Level 1, Level 2, Level 3, and Level 4. These are mostly categorized by how drastic your mutation is, or more scientifically speaking, how much junk DNA your genetic chemistry is allowed to read and then propagate into a full mutation.

Level 1 mutations, or cosmetic mutations, are mutations that don't change the overall biological makeup of the body. Natural blue, pink, or green hair is an example of some of these mutations, as are strangely colored eyes. Sharper nails, which you might consider claws, or pointed ears, which might remind you of an elf, are also cosmetic mutations. All these mutations are doing are slightly altering the size, shape, or color of body parts you would have in the first place. It's estimated that there are far more level 1 mutants in the world than are actually documented, as people with such small changes like this, barely notice them as mutations themselves.

Level 2 mutations do change your biology in some way, but don't necessarily change your style of life. A woman with three breasts, for example, might need to get some specially tailored clothes, but for all intents and purposes she can live her life as any normal non-mutant. She can drive normal cars, sit in normal seats, work normal jobs, and so forth. Level 2 mutants tend to need just a bit of extra medical attention to make sure their body is working the way it should, but for the most part can be treated like normal humans.

Level 3 mutations change your biology in such a drastic way that your style of life is bound to change. Multiple limbs is the most common type of level 3 mutation, as it causes drastic changes to the musculoskeletal system. Level 3 mutations will many times cause massive shifts of internal organs, the circulatory system, and the nervous system as well. While level 3 mutants tend to need much more medical care, as well as special services meant just for them and their new style of life, for the most part, classical biology and medicine can still be applied.

Level 4 mutations are the most extreme. They not only change your body and lifestyle but they introduce biological elements that current science does not adequately understand. Level 4 mutants may grow new organs, possibly organs that we have not yet encountered. Some Level 4 mutants gain what you might consider “powers” but this isn’t a superhero comic. A lizard woman might be more agile, but she also might lose the advantage that a warm blooded mammal body would give her. If a doctor were to examine her they would have to use an entirely different set of medical principles, and may not even understand their internal physiology. Level 4 mutants are a very important sector of study in mutantology, since they are in the most danger should something go wrong. Even a small injury might be difficult to treat for a level 4 mutant, simply because we do not understand how their body heals itself.

Fusions are a bit of a special case and are considered somewhere between level 3 and level 4. For the most part, fusions are human, except they integrate the biology of two or more humans together into one in, quite frankly, wild and fascinating ways. While they are, for the most part, human, they are still human physiology constructed in ways we are just beginning to understand.

### **Mutantology 302 – Mutants vs. “humans”**

Comic books and sci-fi movies have created a lot of misconceptions surrounding mutants.

For example, while there are many mutants that call themselves monsters, aliens, creatures, non-humans, beastmen, and... you know... furies, all of these mutants are, scientifically speaking, human.

In biology, we use procreation to determine a species boundary. Two organisms are members of the same species if they can procreate with each other and yield an offspring which is then capable with again procreating with the same members of the same species.

All mutants so far studied have been shown to be able to have children with other humans and mutants. In addition, all children born of mutant couples can then go on to have children with other humans and other mutants. So, in a strictly biological sense all mutants are “human.”

Or perhaps it is better to say that all mutants are member of the species homo sapiens. The term “human” has not just biological but also social context to it. Many mutants are now making their own societies and communities and some prefer to be thought of as something different from human, embracing their changes as something that define them. Others prefer to treat themselves like any other person, embracing “humanity” as the key thing that separates us from the animals.

How and why people classify themselves as mutant, human, or something completely different is a matter of psychology and sociology and is far beyond the scope of this class. But feel free to check out our mutant social sciences department if you want to know more.

### **Mutantology 303 – The future of mutation**

I’d like to wrap up by talking about the future of mutation and mutant studies. During this lecture series, I have frequently quoted this statistic:

*10% of women and 1% of men are mutants*

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That's true, but only according to a snapshot of the population in 2015. Prior to that, there were fewer mutants, and ever since scientists have estimated that the mutation rate is growing. We predict after the 2020 census, we will learn that about 15% of women, and possibly up to 3% of men are now mutants.

Why is that? Well there are a number of reasons. Children of mutants have a higher chance to become mutants themselves, but that wouldn't explain such a jump in such a short time.

Some scientists theorize that this is a normal part of human physiology, similar to how humans have grown taller over the years. We may just be adapting to a far more complicated world.

Further evidence is lent to this theory by the fact that mutations, for the most part, tend to be beneficial. Multiple arms let you do more things at once. Multiple legs reduce fatigue when walking, running, or standing. Multiple heads increase your cognitive power. Even purely aesthetic things, like multiple breasts, come with stronger and denser back muscles and better hormone regulation. Biology wants to progress and this might be the way it is trying to progress humanity.

In the coming years our priority will be to understand how and why people mutate, how to control mutations, how to treat people with extreme mutations, and how to better understand how mutations can help us in areas such as medical biology. In fact, right now the blood plasma of mutants is being studied to see if it can aid in the recent COVID-19 pandemic.

Practically every mutant has thought to themselves at some point "is there a cure." For right now, the answer is no, but it's because there's nothing really to cure. These are your genes, being expressed in a new way. If your mutation isn't hurting you, then no medical professional worth their degree would suggest undergoing a procedure just to get rid of them. I read horror stories of young girls mutilating themselves just because they don't want to be the freak with multiple arms. If only they knew how many people are out there, just like them. We really are all in this together.

As I said before, epigenetics is a relatively new field of study. As it expands, we may one day understand how and why we mutate to a better degree, and possibly even learn how to purposefully trigger and control mutations. Does this mean that we will be able to "reverse" mutations some day? Maybe, But should we? I'm not so sure.

Mutations have opened up a whole new world for us. There are new sectors of scientific study. New businesses that cater to mutant lifestyle. There are now mutant celebrities and mutant politicians. If there's one thing that can be said for humanity, it's that we know how to adapt.

The world is changing, and I say to you class, don't be afraid of that change. Embrace it, because mutation isn't just some weird thing that is causing some of us to grow extra limbs. It's the story of humanity. It's the story of evolution. Mutations paint our biological history. When two single cells came together to create the first multi-celled organism? That's fusion. When the first worms grew carapaces and legs to become insects, that's just multi-limbs. When the first fish walked on land, the first bird grew wings, and the first ape walked upright, all of these have reflections in the level 3 and level 4 mutants we see out there today.

Mutation isn't just who you are as a person, it's who we are, as a society, as a species, as a planet.

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Thank you for coming, and I hope this has been informative. If you have any questions, see me after class, or e-mail me at [AskMsJessica@gmail.com](mailto:AskMsJessica@gmail.com)

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