

Publicly shared tweets regarding gender formation by Rebecca R. Helm, assistant professor of biology at UNC Asheville



Open Ocean Exploration
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Friendly neighborhood biologist here. I see a lot of people are talking about biological sexes and gender right now. Lots of folks make biological sex seem really simple. Well, since it's so simple, let's find the biological roots, shall we? Let's talk about sex...

If you know a bit about biology you will probably say that biological sex is caused by chromosomes, XX and you're female, XY and you're male. This is "chromosomal sex" but is it "biological sex"? Well...

Turns out there is only ONE GENE on the Y chromosome that really matters to sex. It's called the SRY gene. During human embryonic development the SRY protein turns on male-associated genes. Having an SRY gene makes you "genetically male". But is this "biological sex"?

Sometimes that SRY gene pops off the Y chromosome and over to an X chromosome. Surprise! So now you've got an X with an SRY and a Y without an SRY. What does this mean?

A Y with no SRY means physically you're female, chromosomally you're male (XY) and genetically you're female (no SRY). An X with an SRY means you're physically male, chromosomally female (XX) and genetically male (SRY). But biological sex is simple! There must be another answer...

Sex-related genes ultimately turn on hormones in specific areas on the body, and reception of those hormones by cells throughout the body. Is this the root of "biological sex"??

"Hormonal male" means you produce 'normal' levels of male-associated hormones. Except some percentage of females will have higher levels of 'male' hormones than some percentage of males. Ditto ditto 'female' hormones. And...

...if you're developing, your body may not produce enough hormones for your genetic sex. Leading you to be genetically male or female, chromosomally male or female, hormonally non-binary, and physically non-binary. Well, except cells have something to say about this...

Maybe cells are the answer to "biological sex"?? Right?? Cells have receptors that "hear" the signal from sex hormones. But sometimes those receptors don't work. Like a mobile phone that's on "do not disturb". Call and cell, they will not answer.

What does this all mean?

It means you may be genetically male or female, chromosomally male or female, hormonally male/female/non-binary, with cells that may or may not hear the male/female/non-binary call, and all this leading to a body that can be male/non-binary/female.

Try out some combinations for yourself. Notice how confusing it gets? Can you point to what the absolute cause of biological sex is? Is it fair to judge people by it?

Of course you could try appealing to the numbers. "Most people are either male or female" you say. Except that as a biologist professor I will tell you...

The reason I don't have my students look at their own chromosome in class is because people could learn that their chromosomal sex doesn't match their physical sex, and learning that in the middle of a 10-point assignment is **JUST NOT THE TIME.**

Biological sex is complicated. Before you discriminate against someone on the basis of "biological sex" & identity, ask yourself: have you seen **YOUR** chromosomes? Do you know the genes of the people you love? The hormones of the people you work with? The state of their cells?

Since the answer will obviously be no, please be kind, respect people's right to tell you who they are, and remember that you don't have all the answers. Again: biology is complicated. Kindness and respect don't have to be.