Defining Sex and Gender & The Biology of Sex

Today:
- Defining Sex and Gender
- Conception of a Child
- Chromosomes
- Defects in Chromosomes

Often we hear the terms sex and gender used in our society interchangeably, meaning that people take one for the other.

Sex- the biologically determined physical distinctions between males and females.
- Sex has to do with our chromosomes
- Our physical genitalia
- Out hormones

Gender- socially generated attitudes and behaviors usually organized dichotomously as masculinity and femininity.
- Socially defined.
- Masculinity and Femininity
- Can be fluid/can change

Let’s first focus on the idea of Sex and then we will move into a discussion of Gender.

First, we must review the process of how a child is conceived:
1. Male is needed to provide the sperm
   a. Man will ejaculate inside the woman
   b. Sperm will travel past the cervix
   c. Then pass up the uterus
   d. Then enter and meet up with the egg in the Fallopian tubes (only one of the Fallopian tubes contains an egg, so many sperm travel in the wrong direction). Fewer than 1,000 sperm out of the millions in the semen actually reach the Fallopian tubes.
2. Female is needed to provide the egg
Once they all meet up:
• Many sperm surround the egg in the Fallopian tube. The head of each sperm (acrosome) releases enzymes that begin to break down the outer, jelly-like layer of the egg's membrane, trying to penetrate the egg.

• Once a single sperm has penetrated, the cell membrane of the egg changes its electrical characteristics (depolarizes).
  - This electrical signal causes small sacs just beneath the membrane (cortical granules) to dump their contents into the space surrounding the egg.
  - The contents swell, pushing the other sperm far away from the egg (cortical reaction).

• The other sperm die within 48 hours. The cortical reaction ensures that only one sperm fertilizes the egg.

Other side notes:
- The fertilized egg is now called a **zygote**.

- The depolarization caused by sperm penetration results in one last round of division in the egg's nucleus, forming a pronucleus containing only one set of genetic information.

- The pronucleus from the egg merges with the nucleus from the sperm. Once the two pronuclei merge, cell division begins immediately.

- The dividing zygote gets pushed along the Fallopian tube. By approximately four days after fertilization, the zygote has about 100 cells and is called a blastocyst.

**Chromosomes:**
• Each human is born with forty-six chromosomes, arranged as twenty-three pairs, one of each pair is contributed by the mother and father respectively.
-The sex chromosomes of a genetically normal male consist of one X and one Y chromosome.
-While the sex chromosomes of a female are usually two X’s.

The baby in the early cellular forms inside the womb is really not distinguished as being either male or female, it’s neutral and unable to be seen if there are two XX or XY chromosomes.

People are not sure why week six, but it appears that the Y chromosome causes some form of change at that point.

Then the fetal testes in the male begin to synthesize a whole group of hormones called androgens. Males have a SRY gene (sex-determining region of the Y) and this is what makes the maleness thrive through the cells.

-HORMONES- chemical substances secreted by organs to stimulate a variety of biological activities within the body.

Testosterone- most commonly known hormone, it makes it male, but it also makes the male very fragile.

Abnormalities among Chromosomes:
Before eggs are even fertilized, there can be some problems with the chromosomes provided by either the male or the female.

During the time when the chromosomes are dividing and creating new cells, known as MEIOSIS, there can be problems. When sperm fail to divide properly this is known as nondisjunction.

If the nondisjunction occurs there are three types of sperm that could be produced:
-XX
-YY
-and those with no sex chromosomes
Eggs which are fertilized by these particular nondisjunction type sperm would produce the following abnormalities:

<table>
<thead>
<tr>
<th>Sperm Non-Disjunction</th>
<th>Produced</th>
<th>Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX</td>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>YY</td>
<td>XYY</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>XO</td>
<td>Turner Syndrome</td>
</tr>
</tbody>
</table>

**Turner Syndrome** - this is when people have no Y chromosome and only one X chromosome.
- The outcome is they will not be a male ever, by default they are female.
- However, they will not be able to fully develop all the female genitalia. Therefore, they are labeled a girl, but are not 100% biologically capable of reproduction or having sexual intercourse in some cases.

**Klinefelter Syndrome** - this is when women or men have an extra X chromosome. Thus people who are XXX or XXY,
- XXX women don’t show many if any outwardly visible signs of being different.
- However, the XXY chromosome situation causes a great deal of problems for the male.
  - Smaller penis and testes.
  - Hips usually feminize
  - Breast development
  - They do not usually have the ability to produce sperm
  - Little amount of facial hair
  - Voice will not get deep

- Socially and emotionally, they are not very different, unless their defects are outwardly known. Then, like any other social deviant they face the problem of stigmatization.
**XYY Syndrome**

There are many studies which are begin done to look at people with the XYY genes. Some people think this could be the key to finding out about criminal minds, etc.

- This is not true thus far, we have not found that all criminals have an XYY set-up.

-XYY men will be very tall
- Look very masculine, as they have more testosterone.
- Some studies do suggest that XYY men are more likely than XY men to be placed into jail. However, this too could have to do with their physical characteristics of being tall and “dangerous” also some research suggests that they may commit petty crimes due to a lowered brain functioning.

**What happens though in the Womb? Abnormalities?**

Adrenogential Syndrome (AGS)- Congenital Adrenal Hyperplasia.
- Occurs in 1 in 5,000 to 1 in 15,000 births.
- Exposed to high levels of androgen within the womb.

- If it is a female baby that is exposed, this can impact their reproductive organs and such, if it occurs after their development. It will have a masculinizing effect such as:
  - The clitoris may become enlarges and could even resemble a small penis.
  - Labia may be fused
  - Vagina may be closed.

AGS girls may describe themselves as more of a tomboy than their “normal” female girl friends.

Greater interest by AGS girls in career rather than being a housewife.

There is no research to conclusively say that these girls though become more aggressive than their other female counter-parts.
Androgen-Insensitive Syndrome:
- This is when a male baby (XY) doesn’t respond to the male androgens which are released and so it looks like a girl at birth.
  - They have no uterus
  - They do not menstruate
  - They are very feminine with no masculine traits usually.

This can also be found in partial form, known as DHT deficiency syndrome.

Let’s review a bit of what we have gone over today.

SCIENCE OF THE SEXES VIDEO
(Show until the introducing the gender into the baby)