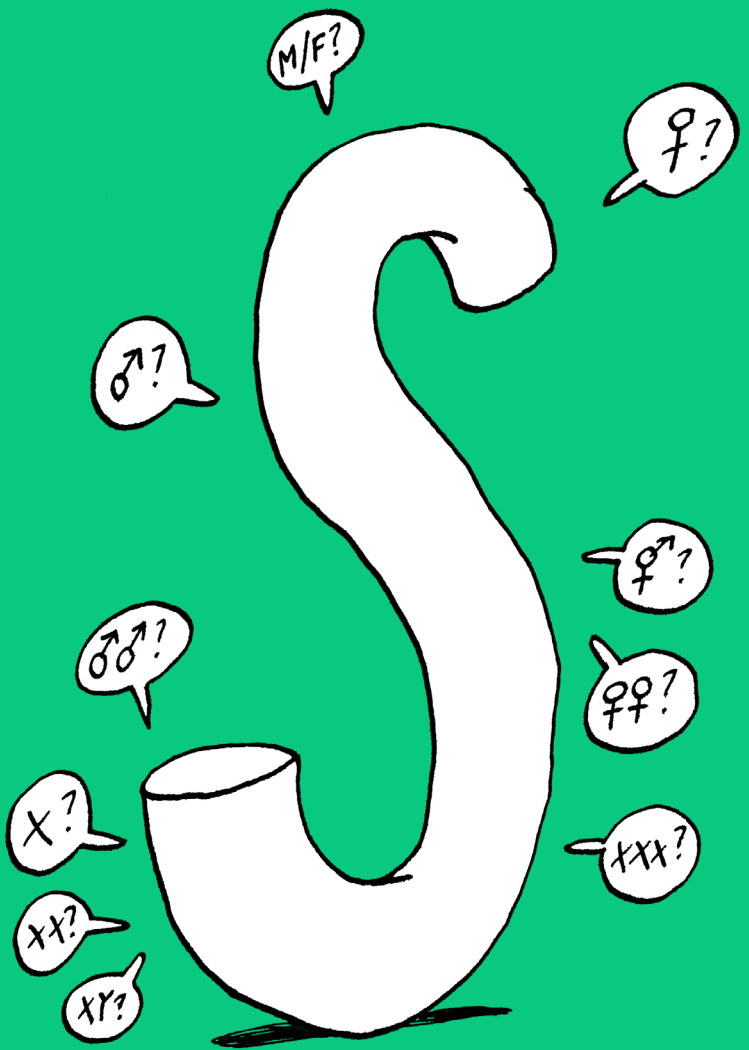
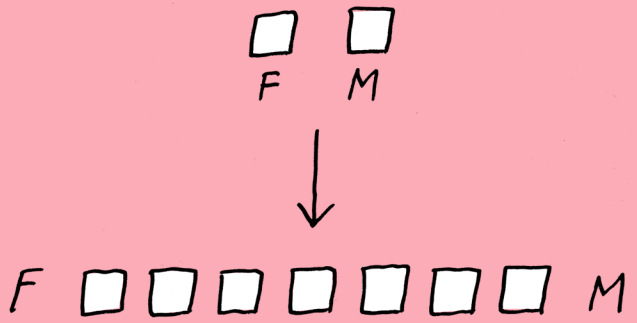
Sexesss



ZOOM IN ON MY BODY



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Sexesss

Before, when you wanted to know someone's sex, we thought you just needed to look between their legs. 2 possible forms = 2 sexes = female/male = simple!

But what to do when a baby is born with external genitals in an intermediary shape between female and male? Operate on them to make their genitals look more like those of a female or male, without asking for their consent?

These practices harmed and still harm lots of people, and they are the subject of debates and studies.

Sex is not only related to the genitals' appearance, it is constituted of multiple levels, some of which are not visible (internal genitalia, ovaries or testicles, sex hormones, chromosomes or even genes). In the human population, each of these elements comprises more than two variants. A binary conception (female/male) is therefore reductive and outdated.

Indeed, humans are an animal species that reproduce by the encounter of two cells: an egg and a spermatozoon. But to be a boy or a girl is more than anything related to an intimate feeling of one's own gender (gender identity) and to an expression of that feeling, through bodily gestures or appearance (gender expression).

Gender identity often conforms to the legal sex assigned at birth, but not always. So there are a multitude of ways, personal and collective, to feel like a boy or a girl, sometimes one and sometimes the other, or neither of the two. That is why today we talk about a sex and gender **continuum**.

Let's not forget sexual and romantic attraction as well, which can vary between people and throughout our lives.

We are going to speak here about **biological sex**, the complexity of which is rarely discussed. Let's discover all its levels and variations together.

Side note: in this brochure, when we speak of girls and boys, if nothing else is indicated, we are speaking of cisgender girls and boys, that is to say whose gender identity corresponds with the sex assigned at birth.

What is “sex” ?

Sex encompasses several notions:

Sex assigned at birth, the legal one, is the one that medical staff declare by looking between our legs.
It can be female or male. In Switzerland, it can be “F” or “M”, while in other countries like Australia or Germany, a third possibility exists.

Biological sex,
is our external and internal genitalia, reproductive cells, hormones, chromosomes, genes, and physical attributes such as hair, breasts, beard, the shape of the body and the voice (secondary sexual characteristics).

WHAT WE ARE TALKING ABOUT IN THIS BROCHURE

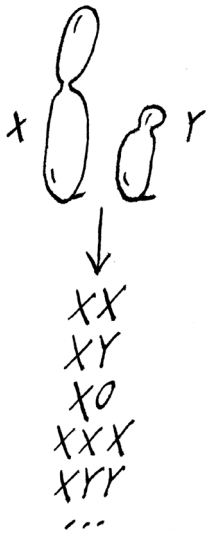
Gender identity,
is our intimate feelings about the fact of being a girl, a boy, both, or neither (gender fluidity). It can correspond to the sex we are assigned at birth (*cisgender*) or not (***transgender***).

Sexuality includes fantasies, sexual practices etc., alone or with other people, whether they are reproductive, for fun, or both!

We often confuse **sexual and romantic attraction** and **gender identity**.
These two notions are different: one is about identity, the other about sexuality. As such, the sexual and romantic attraction of transgender and cisgender people can be homosexual, heterosexual, bisexual, pansexual, asexual or queer.

Must-have glossary of biological sex

Most of us do not know the scientific vocabulary well.

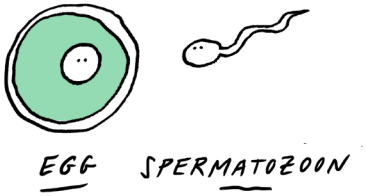


Sex Chromosomes
A human cell's genome is in principle composed of 23 pairs of chromosomes originating both from the spermatozoa and from the egg. The 23rd pair is special: the chromosomes can be of two types named **X and Y**. They are the sex chromosomes. Their combination determines an individual's sex amongst other things. In principle it is:

XX for girls

XY for boys

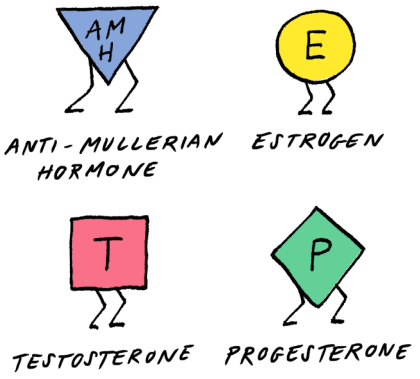
... But it's not that simple (*p.8*)



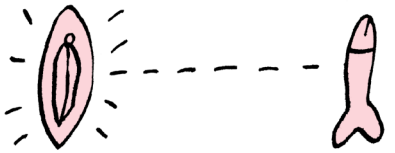
Gametes
These are the reproducing cells (or sex cells): the eggs and the spermatozoa.

Gonads
These organs, ovaries or testicles, contain reproductive cells and produce sex hormones.

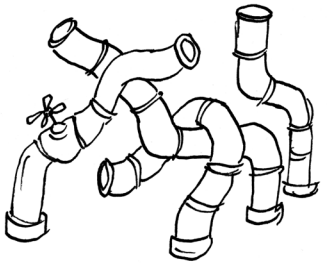
Gonads come in pairs. A gonad may be constituted of a mix of testicle and ovary tissue. This is called an ovotestis.



Sex hormones
These are messengers that indicate, in particular to the genitalia, which shape to adopt during fetal development: female, male or intersex. They contribute to the body's transformation during puberty (development of hair, breasts, voice and body shape). After puberty, these sex hormones influence sexual and reproductive functions. *(p. 10 and 11)*



External Genital Organs
These are the visible genitals: the vulva (outer labia, inner labia, clitoris) as well as the penis and the scrotum containing the testicles.



Internal Genital Organs
These are all the genitalia which are not visible from the outside:

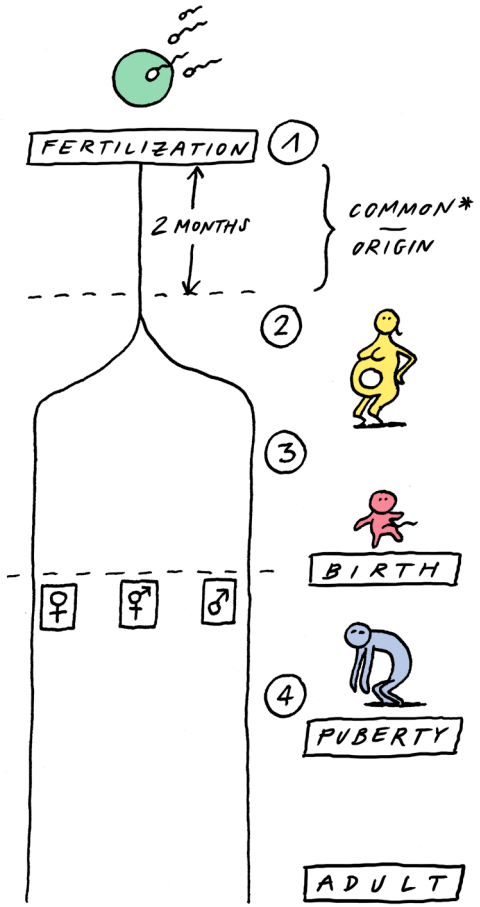
The **canals** which carry gametes or receive the embryo: the vagina, uterus, Fallopian tubes (female), epididymis, vas deferens to the urethra (male).

Accessory **glands**: greater vestibular glands (Bartholin), paraurethral glands (Skene), prostate, seminal vesicles and bulbourethral glands (Cowper).

Intersexuality
Close to 2% of newborns carry a biological variation in sex development (VSD). There are a multitude of variations, some of which are visible at birth and others which will only be discovered later (or never).

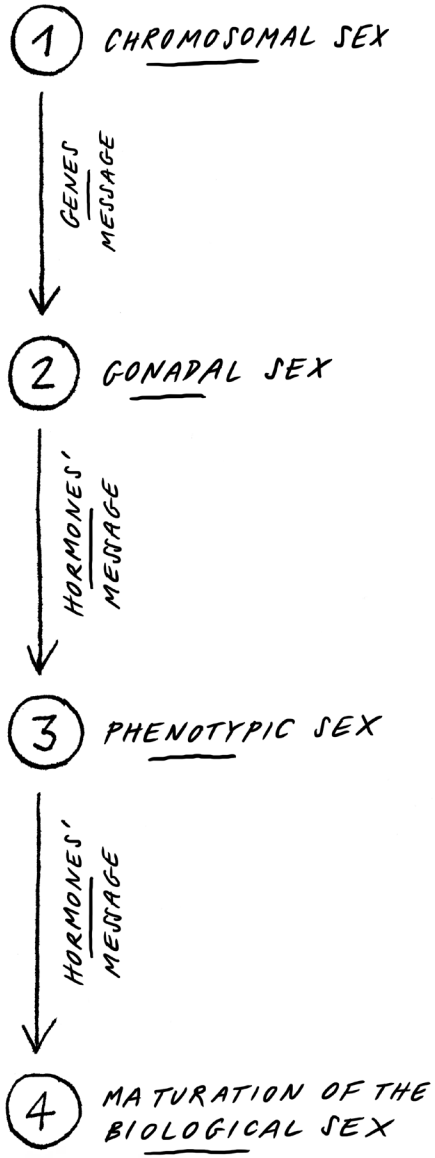
We all start in the same way

The sex is formed during two moments in life, the embryonic development and then during puberty.



* During the first two months of life *in utero*, the female, male and intersex embryos have the same undeveloped genitalia (undifferentiated). Only their chromosomes and/or genes are different.

4 key steps of sexual development



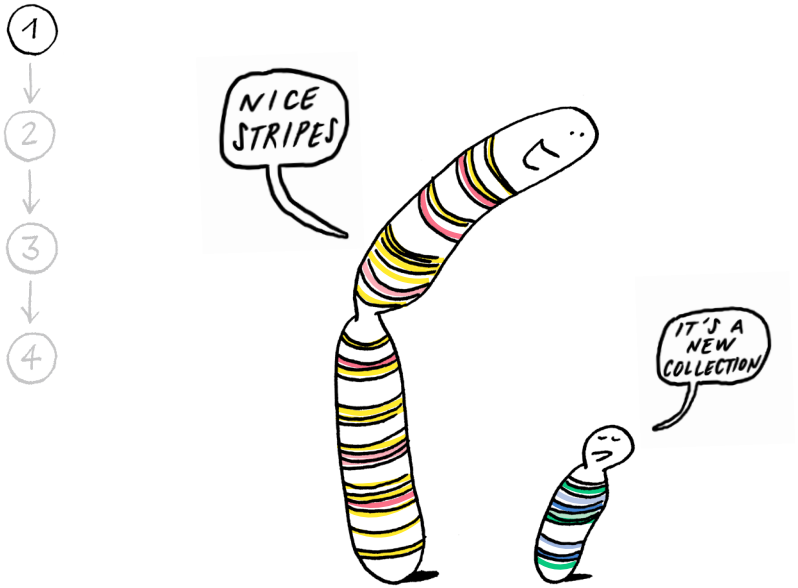
1. **The chromosomal sex** *(p. 8)*
   The combination of our sex chromosomes, determined at fertilization. The ovula generally provides the X chromosome, and the spermatozoon the X or Y.

2. **The gonadal sex** *(p. 9-13)*
   What type of gonads do we have? Ovaries, testicles or in rare cases, ovotestes? In the third month of pregnancy, primitive **gonads** differentiate themselves into ovaries, testicles or ovotestes, depending on the embryo's genetic program. This is called **sex determination**. As soon as the differentiation occurs, gonads start producing sex hormones. Depending on the gonads, different combinations and quantities of hormones will be produced during the 3rd month of pregnancy. This combination of hormones will shape the internal and external genitalia as female, male or intersex.

3. **The phenotypic sex**
   The shape that the external and internal genitalia take: female, male or intersex. The appearance of the external genitals determines the sex assigned at birth.

4. **Maturation of the biological sex** *(p. 14-19)*. The internal and external genitalia, as well as the body, grow and mature as a result of hormones during puberty, in order to reach their adult size, shape and functionalities.

The Chromosomal Sex



In principle, the combination of sex chromosomes determines an individual's sex. Most often this combination is **XX** for girls and **XY** for boys. But biology is diverse and complex!

Certain variations in sex development are the result of other combinations of sex chromosomes. They are usually not life threatening, but they can have an impact on hormone production, height, fertility, etc.

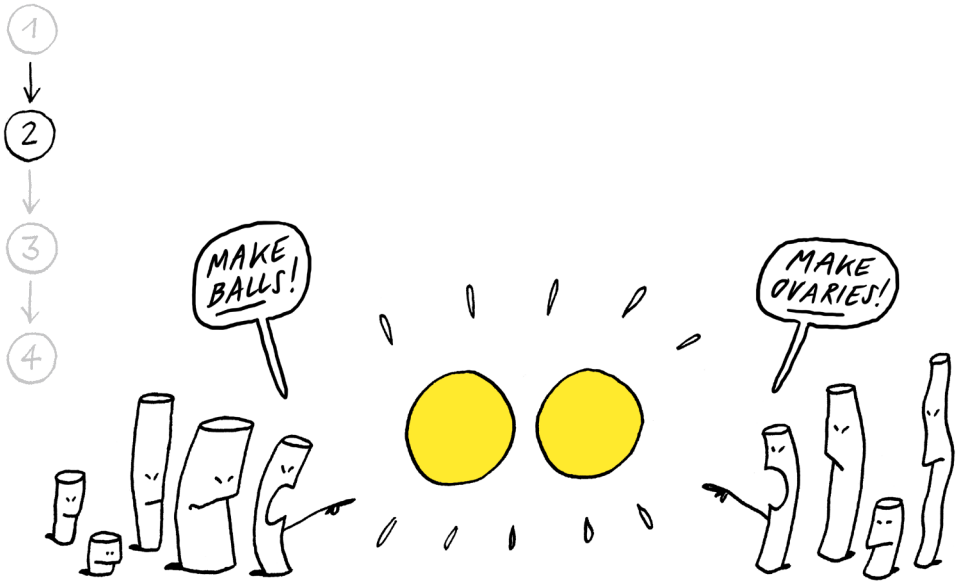
X0*, **XXX**, **XXXX**, ...
Between 1 out of 500 to 2,500 girls live with these VSD.

XXY**, **XYY**, **XXYY**, ...
About 1 out of 500 boys live with these VSD.

***XO** – girls living with one X chromosome (**Turner syndrome**) usually show an absence of menstruations from puberty because the ovaries' development is rudimentary.

****XXY** – boys living with two X (**Klinefelter syndrome**) usually have small testicles.

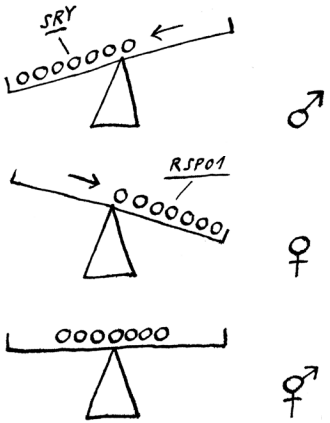
From genes to gonads
Sex determination



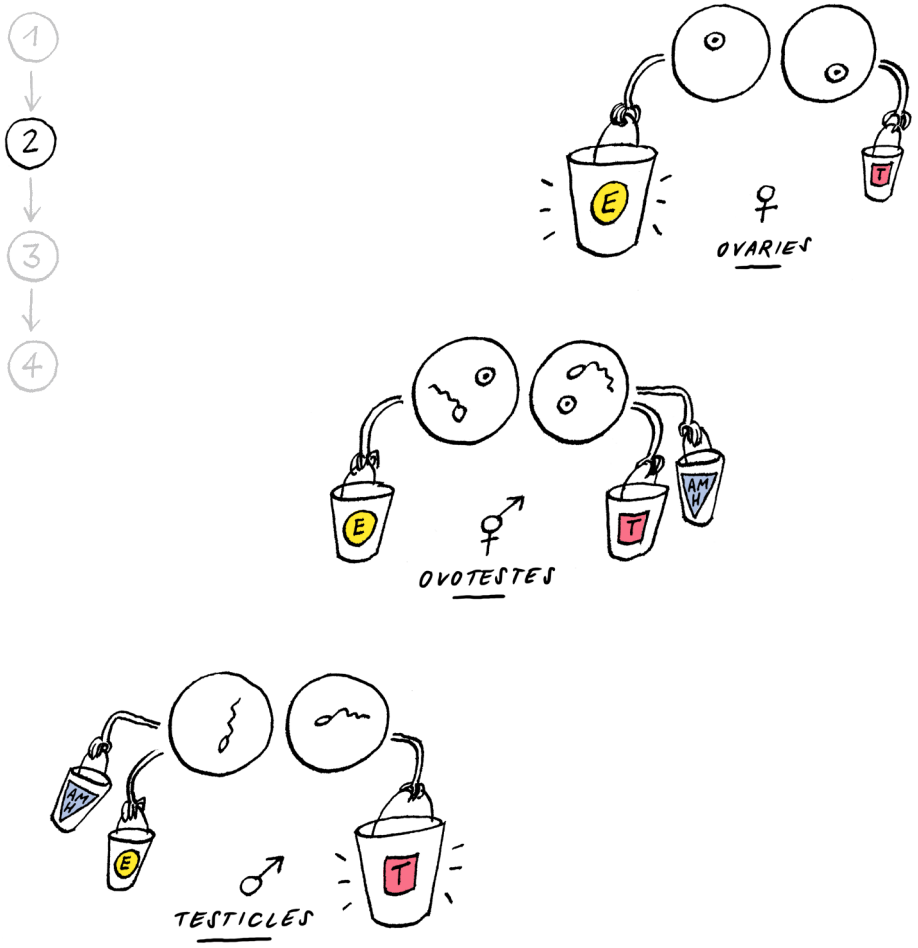
No matter which chromosomes we have, we all have the potential to make female, male or intersex genitalia. The production of ovaries or testicles depends on the messages sent by genes. This "decision" depends on **negotiations between two active and opposed genetic programs**, one female and one male.

During those first two months, these two programs are in a fragile balance. Multiple genes of contradicting convictions exchange around the negotiation table. The SRY gene for example, which can only be found in the Y chromosome, is one of the first to speak. It tries to trigger the male program at the start of the 3rd month, while RSPO1, another gene, contributes to blocking it.

That is the reason why it is usually the presence of the Y chromosome that determines if the embryo will be male. Once one of the two programs overtakes the other, the primitive gonads become ovaries, testicles or more rarely ovotestis.



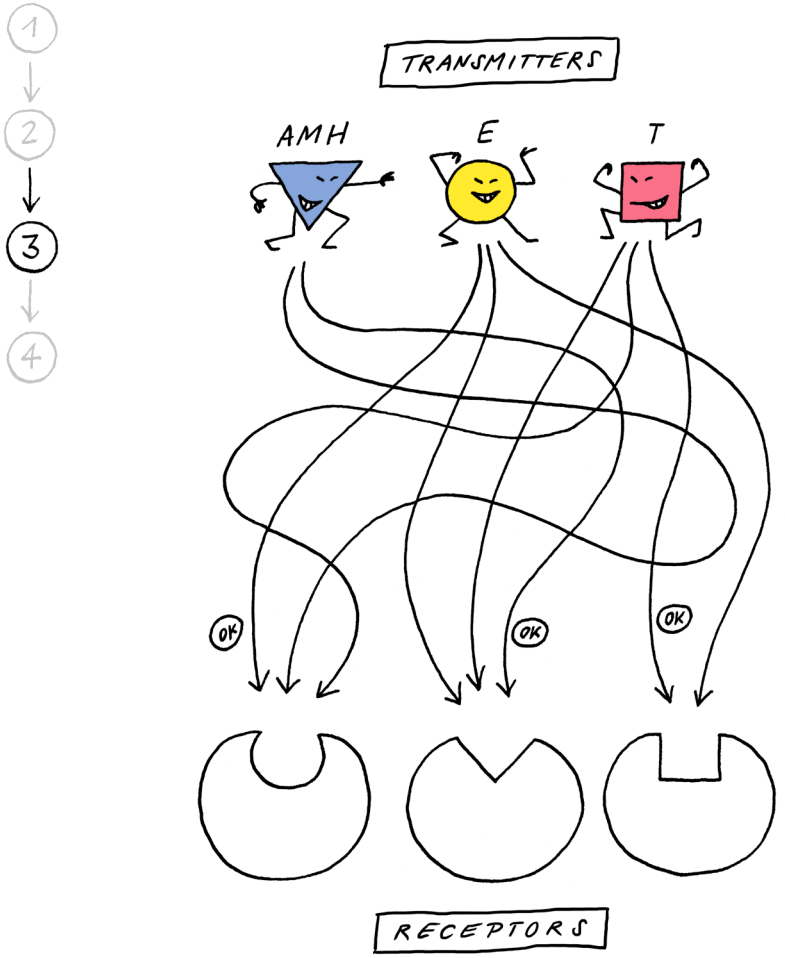
From gonads to hormones



Ovaries, testicles or ovotestes are composed of reproductive cells and cells which produce sex hormones. Throughout the embryonic development, gonads produce hormones which will either masculinize (androgens) or feminize (estrogens) the primitive genitalia. Everybody produces estrogens (E) and testosterone (T). It has to be noted that at this stage, only the testicle and ovotestis produce anti-Mullerian hormone (AMH).

From puberty these hormones regulate, amongst other things, the sexual and reproductive functions.

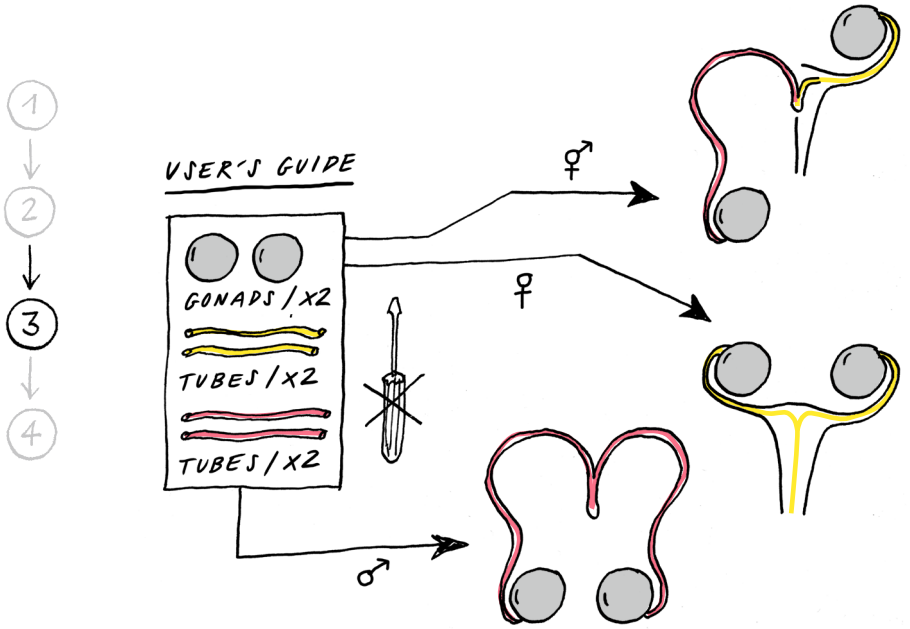
From hormones to the phenotypic sex



Hormones are “long-haul” messengers. They are produced in an organ, circulate through the blood and produce effects in other places. Testosterone, estrogens and AMH affect the body in multiple ways throughout development, puberty and life.

During embryonic development, these three hormones give precise instructions, **through receptors**, to the primitive genitalia’s cells, making them adopt a male, female or intersex form (p.12-13). For that message to be received clearly, for those cells to “hear” and obey, their receptors have to be functional.

Internal genitalia



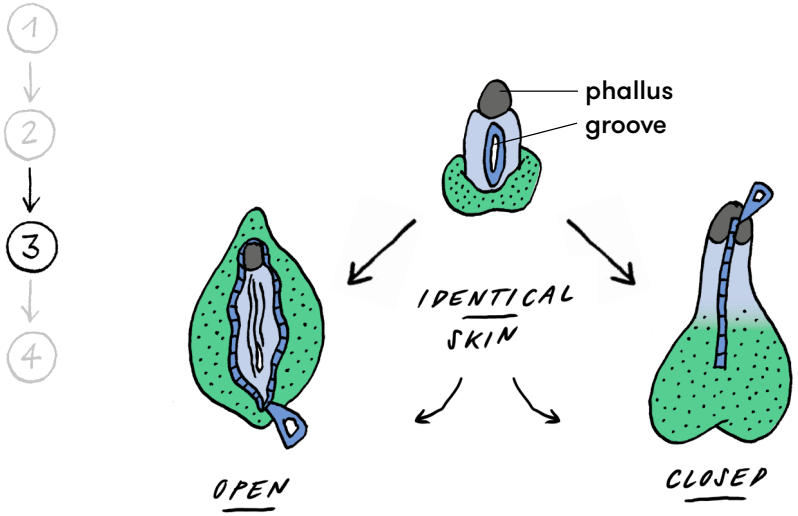
Until the end of the 2nd month of pregnancy, our primitive internal genitalia are formed of two undifferentiated gonads and two pairs of tubes called the Wolffian and Mullerian ducts. **Therefore, we can all potentially make female, male or intersex internal genitalia**. From the 3rd month, hormones will remodel our primitive organs to the shape we know them as (p. 14-17).

♂ AMH makes the Mullerian ducts disappear (which explains its name). Testosterone elongates the Wolffian ducts which will later form the epididymis, the vas deferens and the accessory glands, and helps the testicles down the inguinal canal. They will then travel down into the scrotum, thanks to another hormone's effect (*the insulin-like factor 3*).

♀ When embryos have ovaries, the Mullerian ducts fuse to create the vagina, the uterus and the tubes. The Wolffian ducts disappear. We should take note that the hormones' actions on the development of internal female genitalia are not well-known.

♂♀ An intersex person can carry two different gonads: an ovary and an ovotestis for example. Depending on the quantity of hormones, both the Mullerian and Wolffian ducts can persist. The person can then have a hemi-uterus on one side, and ductus deferens on the other.

External genitals



During the first 2 months of pregnancy, all embryos have similar external genitals: everybody has a phallus and everybody has a groove!

♂ For boys, the groove closes like a zipper, from down to up, under the influence of a testosterone derivative, DHT. The scrotum, penis and urethra are formed. The penis elongates and the testicles descend in the scrotum, generally at the end of the pregnancy. The "zipper" line stays visible after birth between the testicles and along the penis.

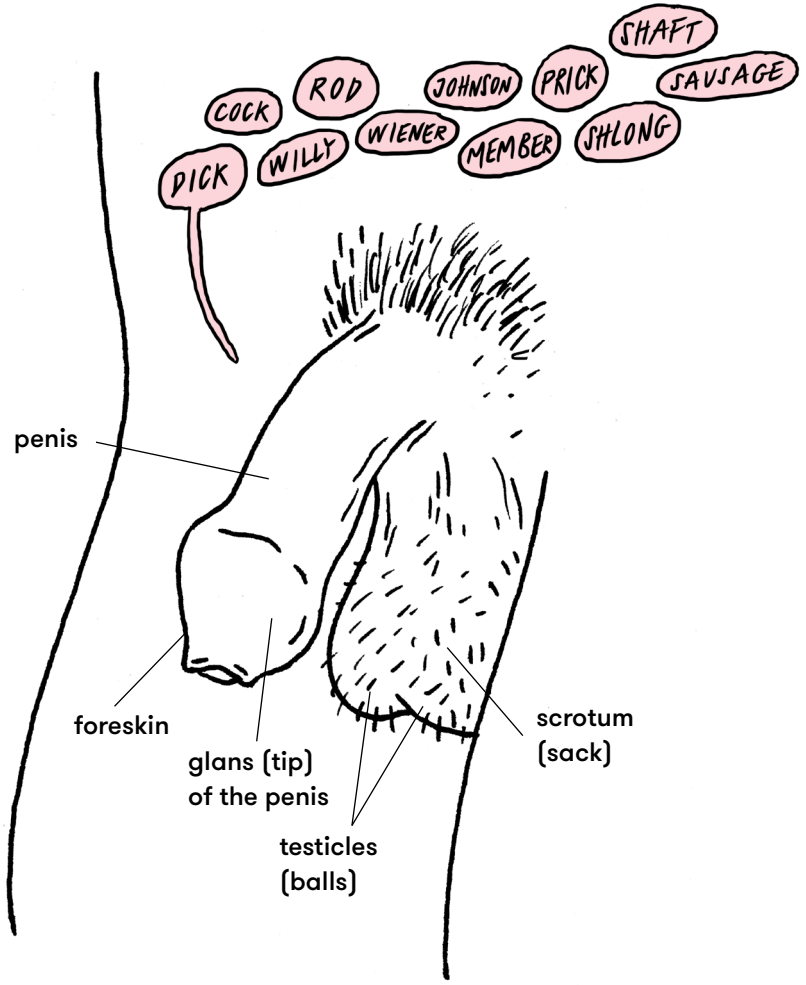
♀ For girls however, the phallus folds to form the body and the tip of the clitoris. The groove stays open and two pairs of labia form around the vaginal and urinary openings (p. 14-17).

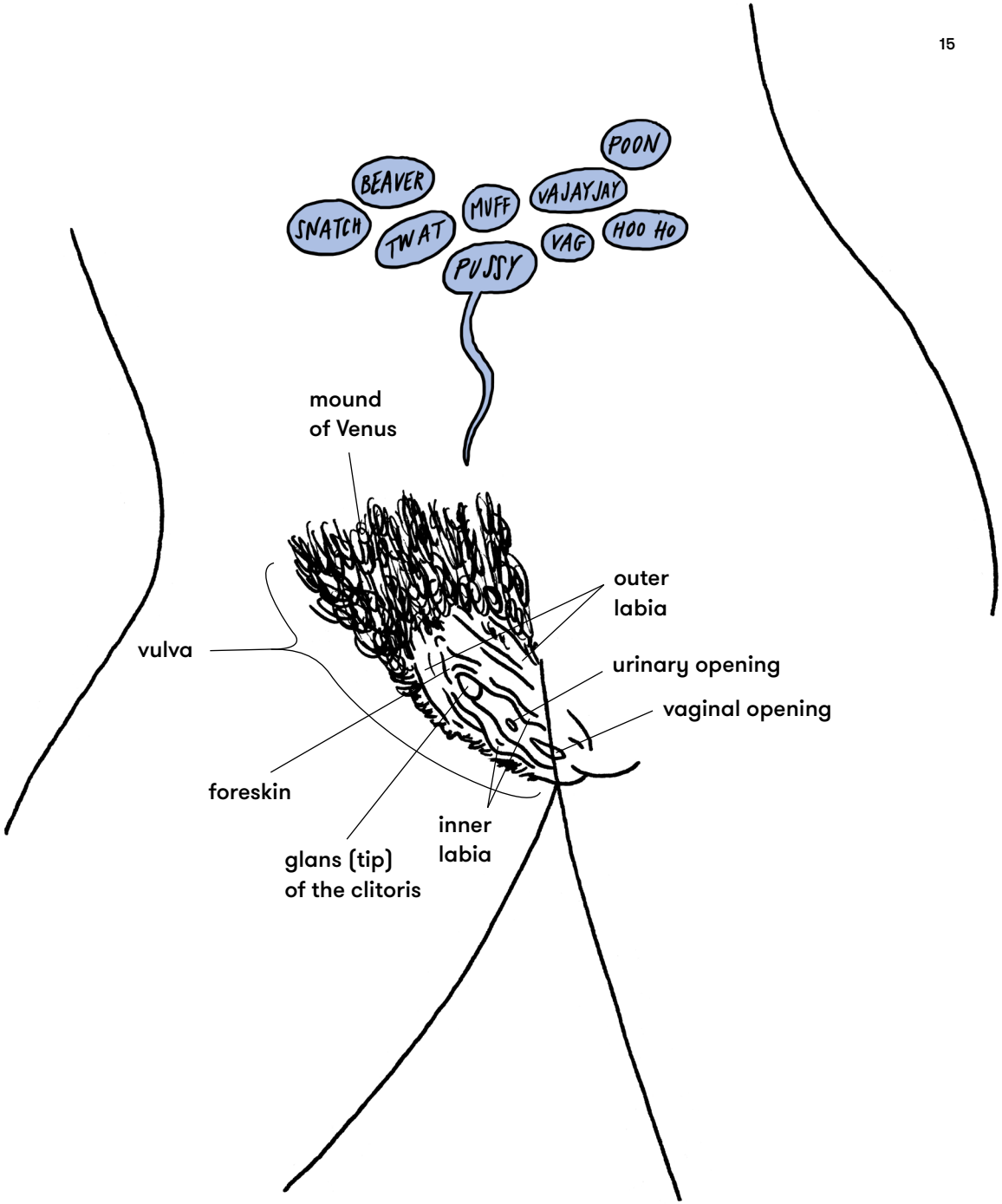
♂ **Androgen insensitivity syndrome** occurs in people whose androgen receivers don't work. The primitive genitalia's cells don't masculinize, or not much. These girls are XY but have female external genitals.

Boys with **hypospadias** have a urinary opening which is located along the "zipper" because it hasn't closed completely.

People with **congenital adrenal hyperplasia** produce more androgens than usual. Their external genitals will then *masculinize*. The clitoris may be bigger and the groove can be open or closed.

Spot the (not so many) differences





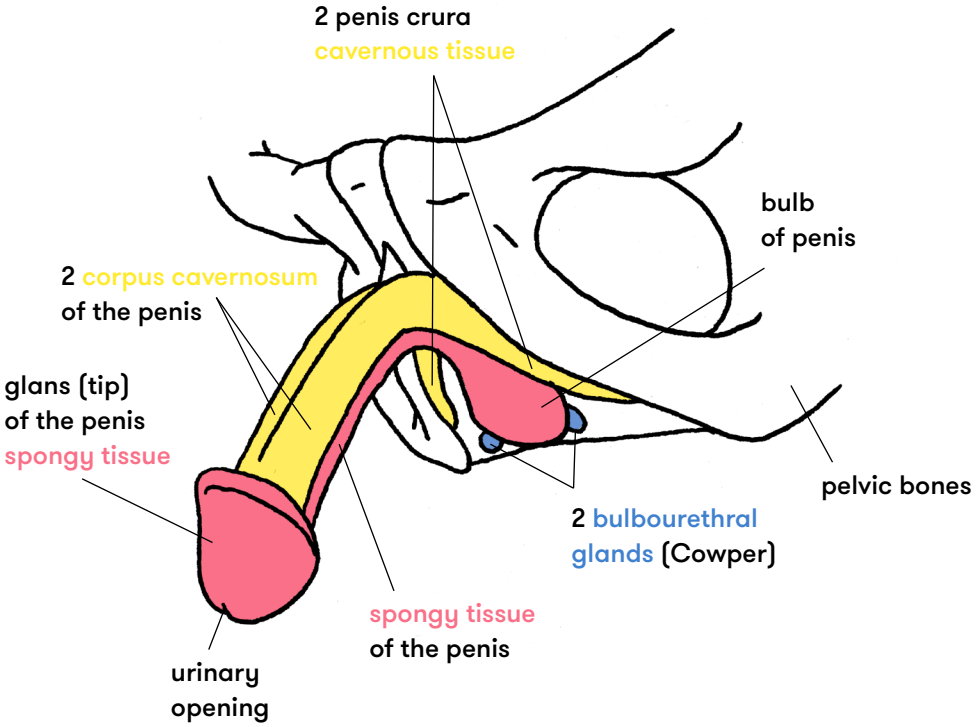
1/3 – As seen from the outside
What we see with the naked eye!

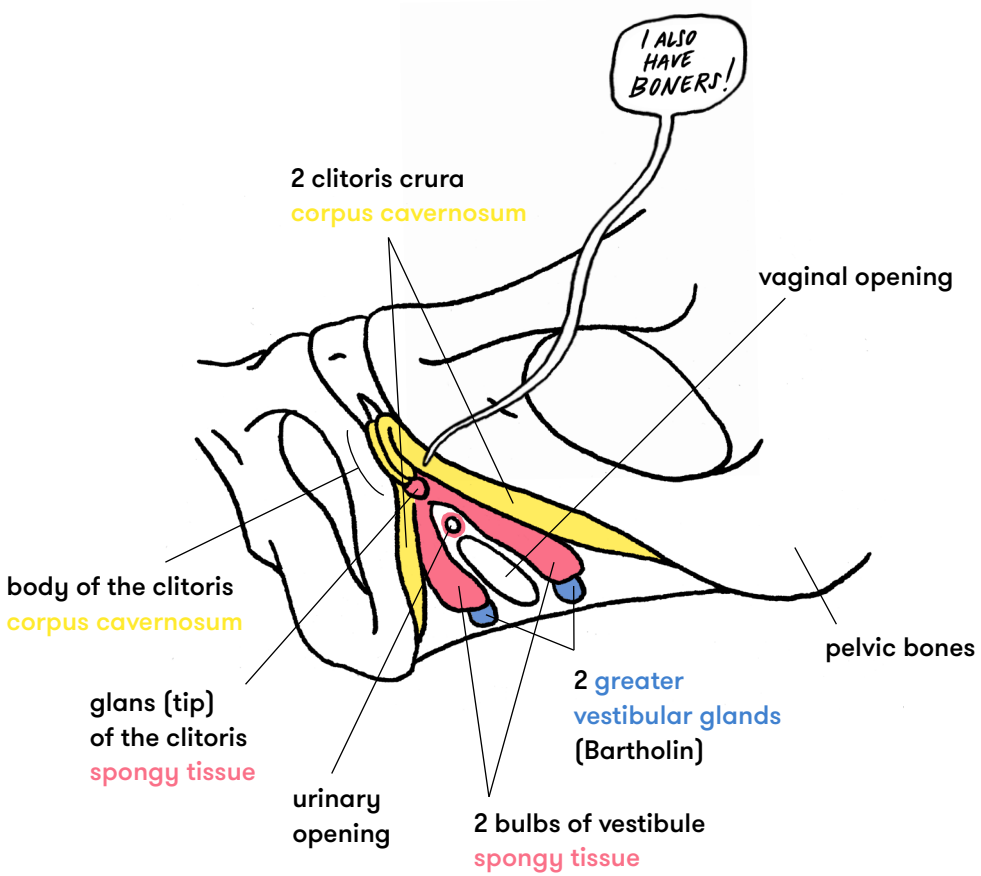
Even though we easily recognize female and male genitals, there are as many variations as there are humans on Earth!

Just like the nose or ears, the vulva, penis and scrotum vary in shape, size, color, etc. For example, the inner labia can be larger than the outer labia or not, or be asymmetrical.

Note: The drawing on the left represents an uncircumcised penis, the foreskin therefore covers the tip of the penis. The inner and outer labia of the vulva naturally cover the urinal and vaginal opening; on the right-side drawing, they have been spread apart so they are visible.

Spot the (not so many) differences





2/3 – As seen on the inside
We're all geared up for pleasure!

The penis and the clitoris have a common embryonic origin (p.11), which is why they have so much in common, especially when we talk about their role in sexual arousal and pleasure.

→ The tips of the penis and clitoris have the same receptors for sexual pleasure.

→ These two organs are shaped in very similar ways (glans, body, crura, bulbs).

→ The crura of the clitoris and penis are attached to the pelvic bones.

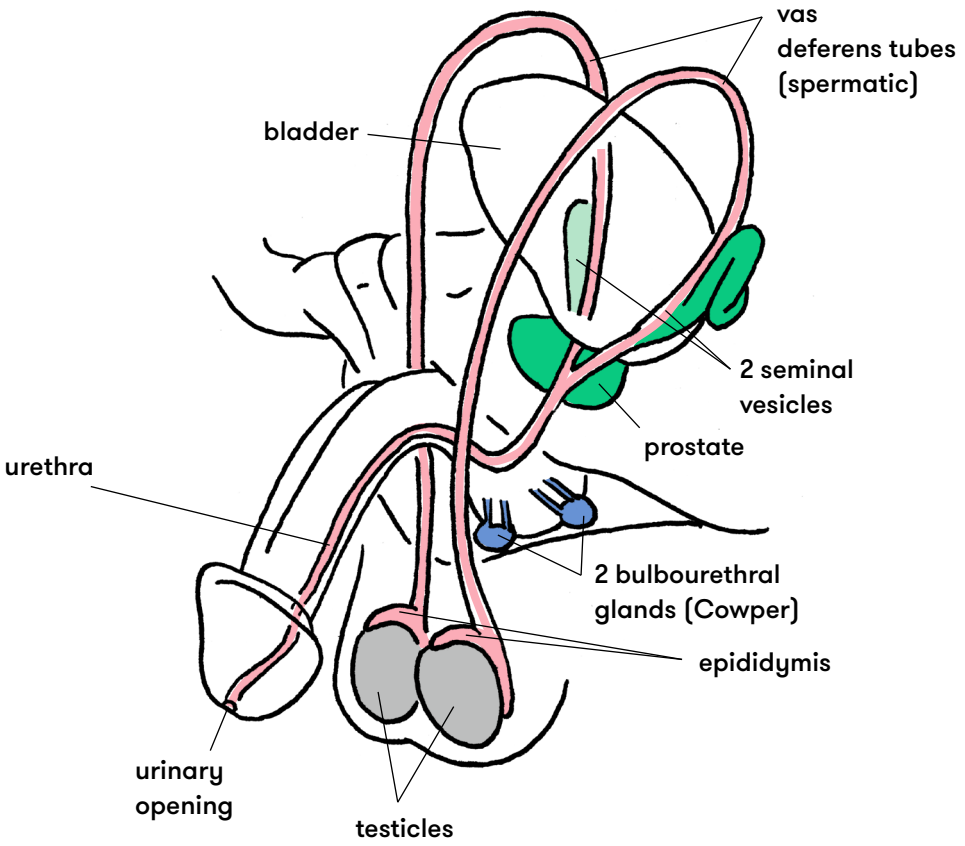
→ Both the clitoris and the penis are made of cavernous and spongy tissues; these are erectile tissues which, during sexual arousal, fill with blood, swell and become hard.

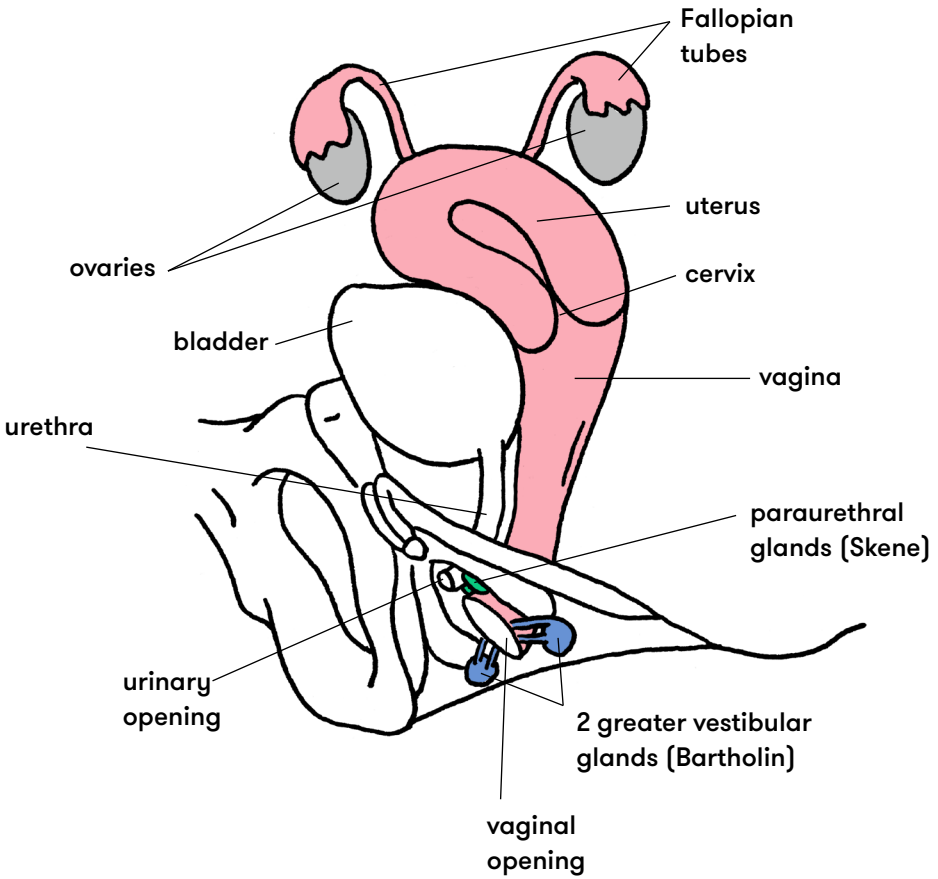
The clitoris' erection is less visible than the penis', because it is smaller and for the most part hidden.

→ Sexual arousal also produces lubricating fluids through the vaginal walls and the greater vestibular glands for the female, and through the bulbourethral glands for men.

It is important to note that sexual desire and pleasure, genital or not, depends on multiple factors which are unique to each individual, but which always involve the nervous system.

Spot the (not so many) differences





3/3 – The inside plumbing
The reproductive system

Reproducing is possible for humans thanks **to reproductive tubes** which allow transport and delivery of gametes from their production site, **the ovaries and testicles**, to their meeting point: the Fallopian tubes! **The accessory glands** contribute to **ejaculation for both males and females.**

If fertilization occurs, the embryo will set up camp in the uterus, which will remain its growing place for the following 9 months. The vagina is very elastic and, if everything goes well, it is the exit for the baby.

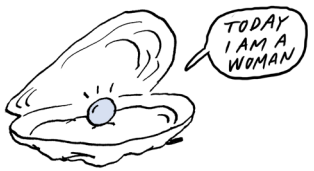
Gender identity

We have seen that the genitalia's development involves messages coming from genes and hormones. These messages also have an impact on other body parts, including the brain. *Gender identity* partly depends on the hormones' messages, but also on social, cultural and interpersonal factors, and the course of one's life. Gender identity can therefore correspond to the sex assigned at birth (*cisgender*), or not (*transgender*). It is said that gender identity is developed and confirmed throughout many years and that it usually stabilizes around puberty. But that is not always the case. Such an identity can stabilize earlier, later, but can also fluctuate throughout your entire life (*gender fluidity*).

All sexes are found in nature

In humans, eggs and spermatozoa are made in two different bodies (female, male). For many of Earth's species, those two types of cells are made in the same body (hermaphroditism). Such an individual can also switch sex and be sometimes one and sometimes the other.

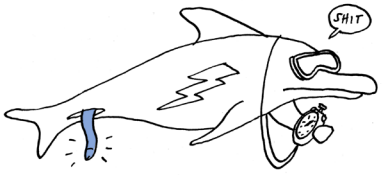
Most plants but also a majority of mollusks are hermaphrodites. For example, every snail can inseminate another with spermatozoa. Oysters are sometimes male, sometimes female, depending on the season!



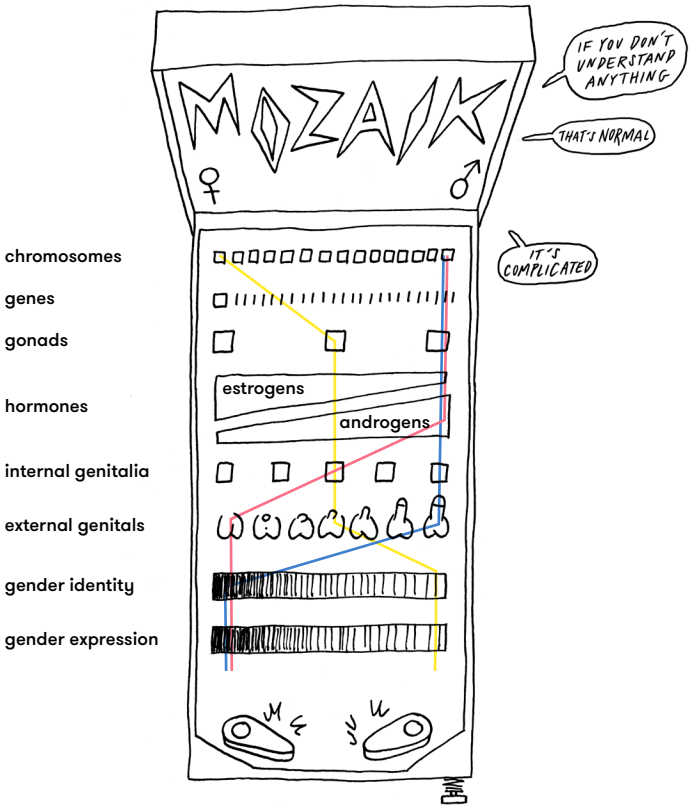
¼ of all fish species on coral reefs can change sex throughout their life! These fish lose their capacity to create one type of gamete and acquire the ability to produce the other type! Moreover, their social role changes (what we call "gender" as humans). For example, the clownfish is first male and then female, and on the contrary, the parrotfish is first female and then male.

The females of many species of mammals (hyenas, bears, monkeys, etc.) have *masculinized* external genitals – they have a penis with which they copulate and give birth.

On the contrary, dolphins and whales have feminized external genitals, for aquadynamic reasons. Their testicles can often be found in the abdomen and the penis is hidden inside of a split, covered by a sort of labia.



To each their own (gender/sex)



In this brochure, we have seen that there are more than two categories on each level of the biological sex (female/male). Our biological sex is therefore not binary but is rather a mosaic unique to each of us. In addition to that, there are infinite ways to feel and express our gender.

All of these elements contribute to a person's sex.

- An XY person can have female external genitals, internal testicles and know themselves to be a girl.
- An XX person can have ovotestis and feel like a boy.
- An XY person can have male genitalia and live as a girl.
- Etc.

Therefore, there aren't two ways of being and living our sex and gender, but an infinity. That is why we talk about the *continuum of sex and gender*.

An assigned or self-determined sex?

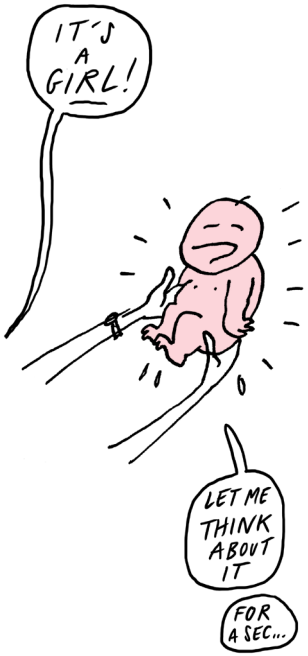
We have learnt that...

- → Each of us have undifferentiated genitalia during the first 2 months of our in-utero life.
- → Everybody has the biological potential to develop male or female internal and external genitalia, or somewhere in between.
- → The penis and the clitoris are made with the same erectile and sensitive tissues and have a very similar internal shape.
- → Everybody can, deep inside, potentially feel man, woman, both or neither of those two.
- → Everybody has the freedom to express their gender in society, individually and uniquely. Nevertheless, unfortunately expressing that freedom nowadays can lead to violence and discrimination.
- → Everyone has their place on the continuum of sex and gender.

Despite all of this, when we are born, legal sex is assigned in a binary way at the sight of our genitals.
It's a girl! It's a boy!

For many of us that is not a problem, but that's not the case for others. It is particularly serious for intersex people, whose operations, often done during childhood, have extreme consequences on their reproductive and sexual health.

Each individual must have the freedom to self-determine and define their sex and gender when growing up.



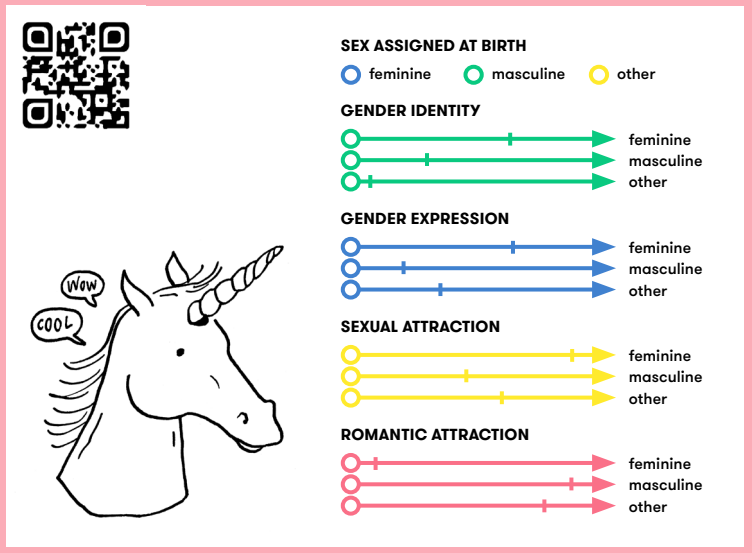
Gender unicorn

The interrelations between biological sex, gender identity and sexual and romantic attraction are complex, unique to each of us, and fluctuate all our lives.

Here is a tool, used by certain specialists, which allows us to situate our personal feeling around sex, gender and sexuality.

It allows us to define our own mix of feminine and masculine.

Try it by scanning this QR code with your smartphone or other compatible device!



Resources on sex, gender and sexuality

You can find healthcare professionals and sexual health centres through the Planned Parenthood organisation.
www.plannedparenthood.org/get-care

Organisations such as the Trevor Project, the LGBT National Help Center or Gender Spectrum provide information, support and resources to LGBTQ young people.
www.thetrevorproject.org
www.glbthotline.org
www.genderspectrum.org

Organizations such as InterAdvocates or InterConnect can provide information and resources on Intersexuality.
interactadvocates.org
interconnect.support/youth

Parents can fin resources on Sexpositive families. More resources on the SSI website.
sexpositivefamilies.com/resources
www.unige.ch/ssi/ressources

Sciences, sexes, identities

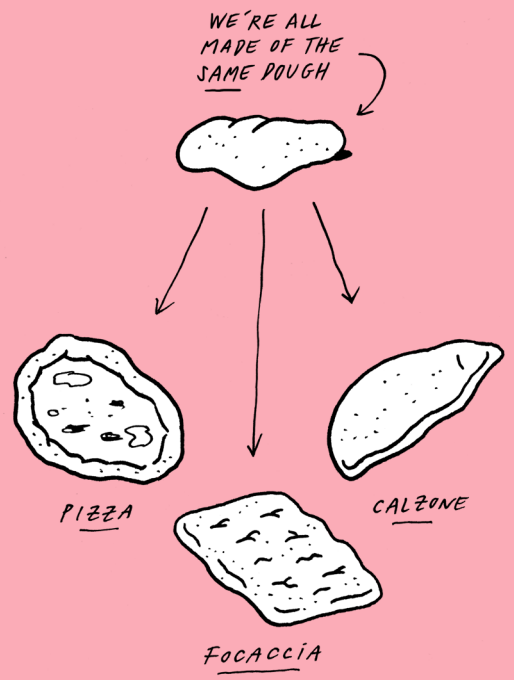
The Sexesss brochure was created and produced in the context of the *Sciences, Sexes, Identities* program in the University of Geneva.

Launched in 2018, the *Science, Gender, Identities* (SSI, www.unig.ch/ssi) program aims to promote sexual health and gender equality by raising awareness and informing, education and health professionals as well as the general public, about sex, gender and sexuality issues, in their biological and social dimensions.

SSI's resources and trainings aim to improve body awareness and knowledge about genital anatomy and the physiological basis of sexuality, and to change attitudes that lead to sexist and homo-, bi- and transphobic discrimination and violence, as well as to inequalities in access to care.

SSI was conceived and is lead by a team of scientists and clinicians from Geneva University (Faculty of medicine, Bioscope) and Geneva University Hospital (DFEA), with many partners such as SANTÉ SEXUELLE SUISSE, the swiss national public radio-television network (RTS), the Geneva state public school department (DIP) and other public institutions and NGO.

Web page of the project: **www.unige.ch/ssi**



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What makes you a girl?
What makes you a boy?

- [ ] haircut
- [ ] genitals
- [ ] chromosomes
- [ ] bodily gesture
- [ ] hormones
- [ ] habitudes
- [ ] breasts
- [ ] hair
- [ ] passport
- [ ] other

Or maybe you don't feel any of the two,
or both at the same time?

You decide!

RTS Découverte Bioscope UNIGE
REPUBLIQUE ET CANTON DE GENEVE
HUG Hôpitaux Universitaires Genève
UNIVERSITÉ DE GENÈVE SERVICE ÉGALITÉ
UNIVERSITÉ DE GENÈVE BIBLIOTHÈQUE
Fondation privée des HUG
L.RAPHAEL GENEVE