



Libyan International Medical University  
Faculty of Pharmacy

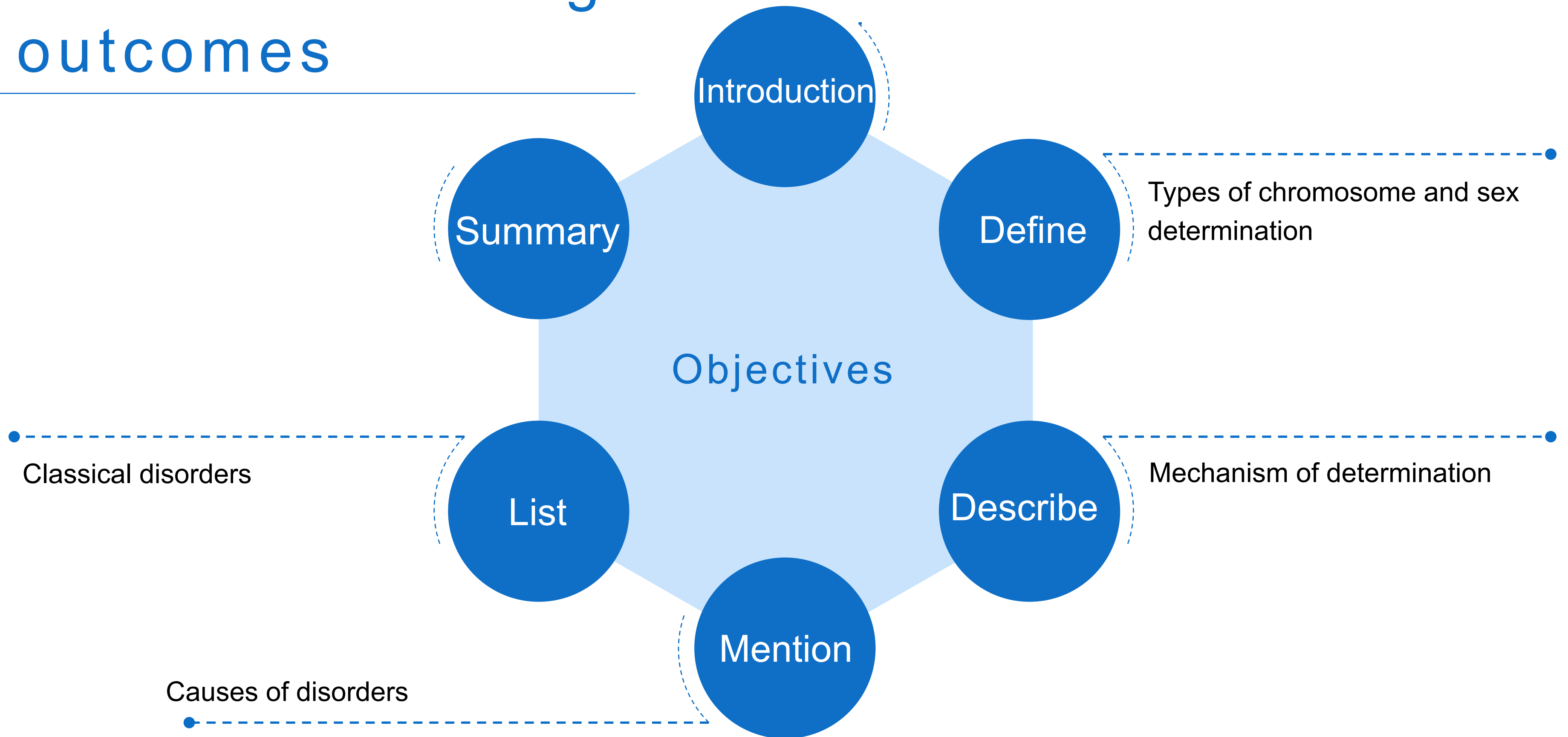


# Sex Chromosome and Sex Determination

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# Intended learning outcomes

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# Introduction

- ▶ Chromosome Discovered by Walther Flemming
- ▶ Generally recognized that chromosomes were first discovered in **1882** (Primary research). discovered it via seeing cell division.



## Continued

- ▶ Sex Chromosome Discovered by Nettie Stevens
- ▶ Where discovered in 1905, While studying the mealworm (model organism), she found that the males made reproductive cells with both X and Y chromosomes whereas the females made only those with X.

# Define sex and non-sex chromosome

## ◆ Sex chromosome

A sex chromosome is a type of chromosome that participates in sex determination, 23rd in number on paired chromosome.

Humans and most other mammals have two sex chromosomes, the X and the Y.

Females have two X chromosomes in their cells, while males have both X and a Y chromosomes in their cells.

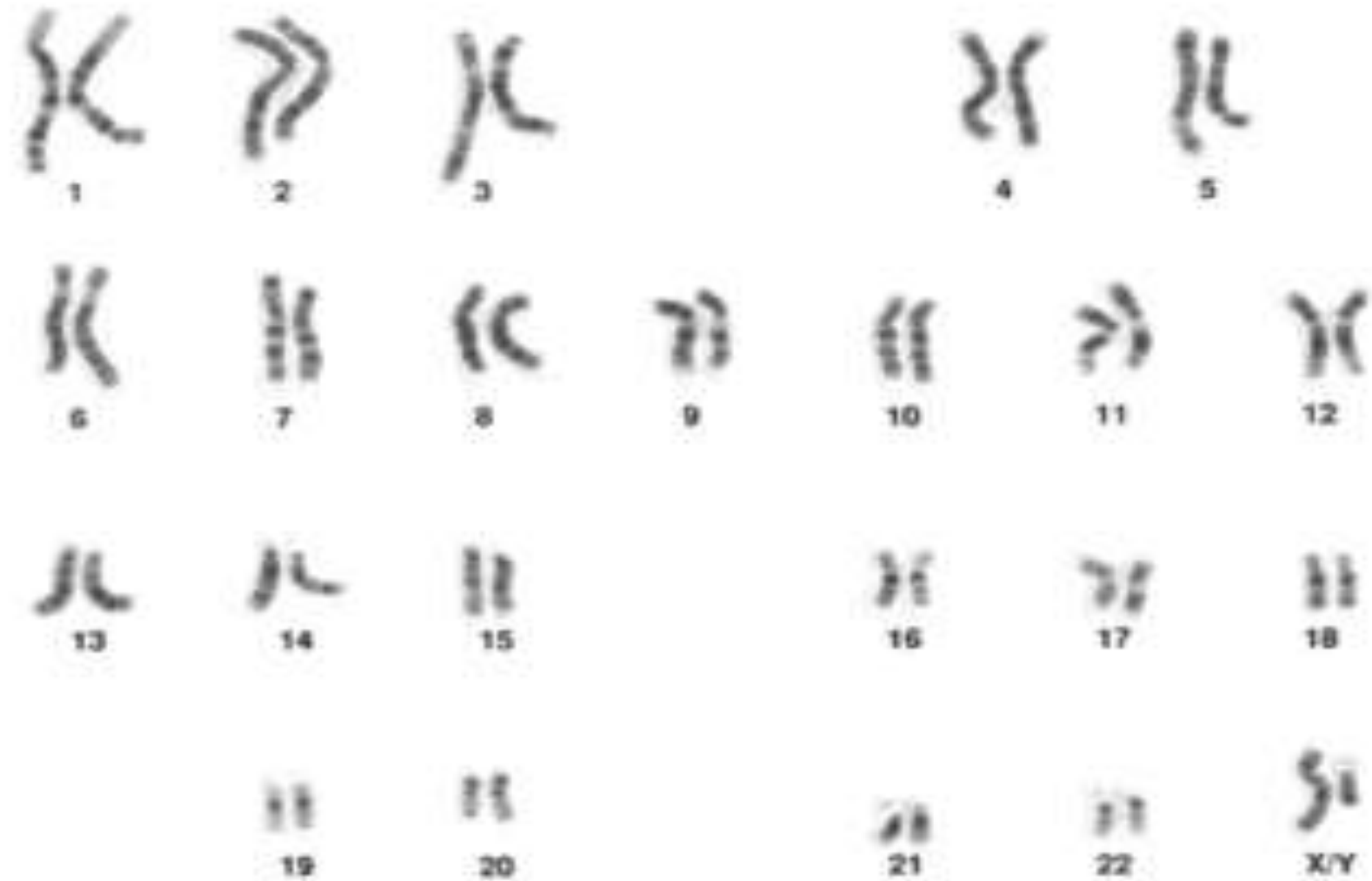
# Define sex and non-sex chromosome

## ◆ Non-sex (autosome chromosome)

An autosome is any of the numbered chromosomes, as opposed to the sex chromosomes.

Humans have 22 pairs of autosomes and one pair of sex chromosomes (the X and Y).

Autosomes are numbered in relation to their sizes.



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## Sex and non-sex chromosome

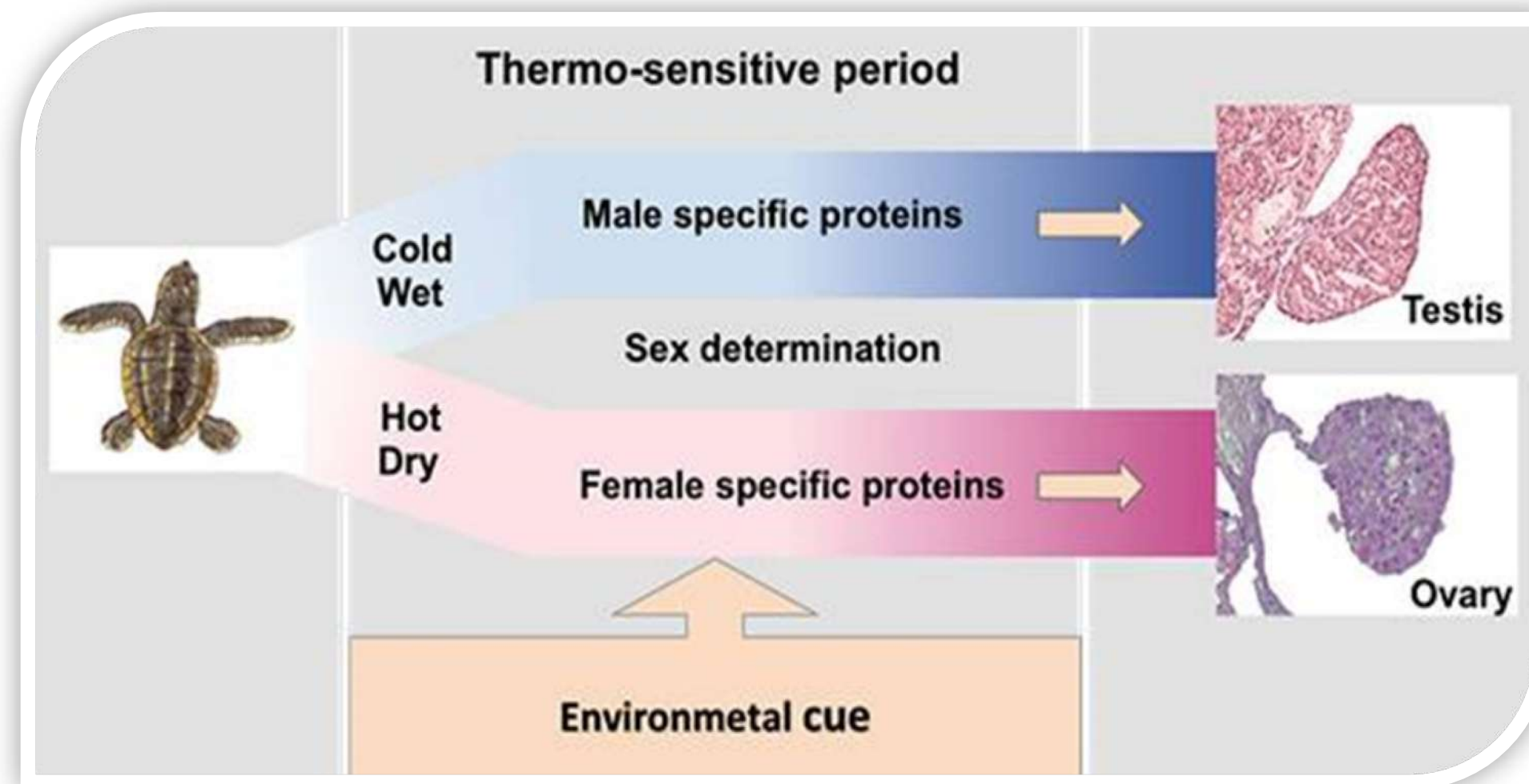
# Define determination of sex chromosome

**A sex-determination** is a biological system that determines the development of sexual characteristics in an organism.



# Mechanism of sex determination

The sex of some other animals is determined by environmental factors. For example, the sex of many species of turtle by the temperature at which the eggs are incubated.



# Mechanism of sex determination

## Genotypic Sex Determination



Z,W → Sex chromosomes

Female → Different chromosomes (ZW)

Male → Similar chromosomes (ZZ)

Sex of Birds' offspring  $\xrightarrow[\text{on}]{\text{depends}}$  Females

ZZ × ZW



ZZ (Male)

ZZ × ZW



ZW (Female)

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# Mechanism of sex determination

The SRY gene (blue band) on the male Y chromosome regulates sex determination in mammals. In placental mammals, the presence of a Y chromosome determines sex.

# Common cause of chromosome disorder

The most common cause of sex chromosome aneuploidies is **non-disjunction**, which can occur during meiosis or during the early stages of postzygotic development.

The loss or gain of genetic material can affect all daughter cells.

# Sex chromosome disorders

Classical disorders of sex chromosome are:

- ◆ **Klinefelter syndrome:** Extra in X chromosome (XXY).
- ◆ **XX male.**
- ◆ **XYY male**
- ◆ **Turner syndrome:** X chromosomes is missing.
- ◆ **XXX female.**
- ◆ **XY female.**

Most of these disorders have abnormal sex chromosome.

# Summary

- A sex chromosome is a type of chromosome that participates in sex determination.
- An autosome is any of the numbered chromosomes, as opposed to the sex chromosomes.
- Autosomes are Diploid, and Sex chromosomes are Haploid in structure.
- **A sex-determination** is a biological system that determines the development of characteristics in an organism.
- The most common cause of sex chromosome aneuploidies is **non-disjunction**.

# References

1. <https://www.nature.com/articles/6800856#:~:text=It's%20generally%20recognized%20that%20chromosomes,by%20Walthe%20Flemming%20in%201882.>
2. <https://academic.oup.com/gbe/article/12/6/750/5823304#:~:text=Sex%20chromosomes%20were%20discovered%20by,2017.>
3. <https://www.genome.gov/genetics-glossary/Sex-Chromosome#:~:text=A%20sex%20chromosome%20is%20a,Y%20chromosomes%20in%20their%20cells.>
4. <https://www.dreamstime.com/stock-illustration-sex-determination-vector-illustrator-computer-design-image60818422.>
5. <https://www.sciencedirect.com/topics/medicine-and-dentistry/sex-chromosome-aberration#:~:text=The%20most%20common%20cause%20of,partial%2C%20leading%20to%20tissue%20mosaicism.>
6. <https://pubmed.ncbi.nlm.nih.gov/9396296/#:~:text=Classical%20disorders%20of%20sex%20chromosome,disorders%20have%20abnormal%20sex%20chromosome.>

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Thanks for  
listening

ANY QUESTIONS?