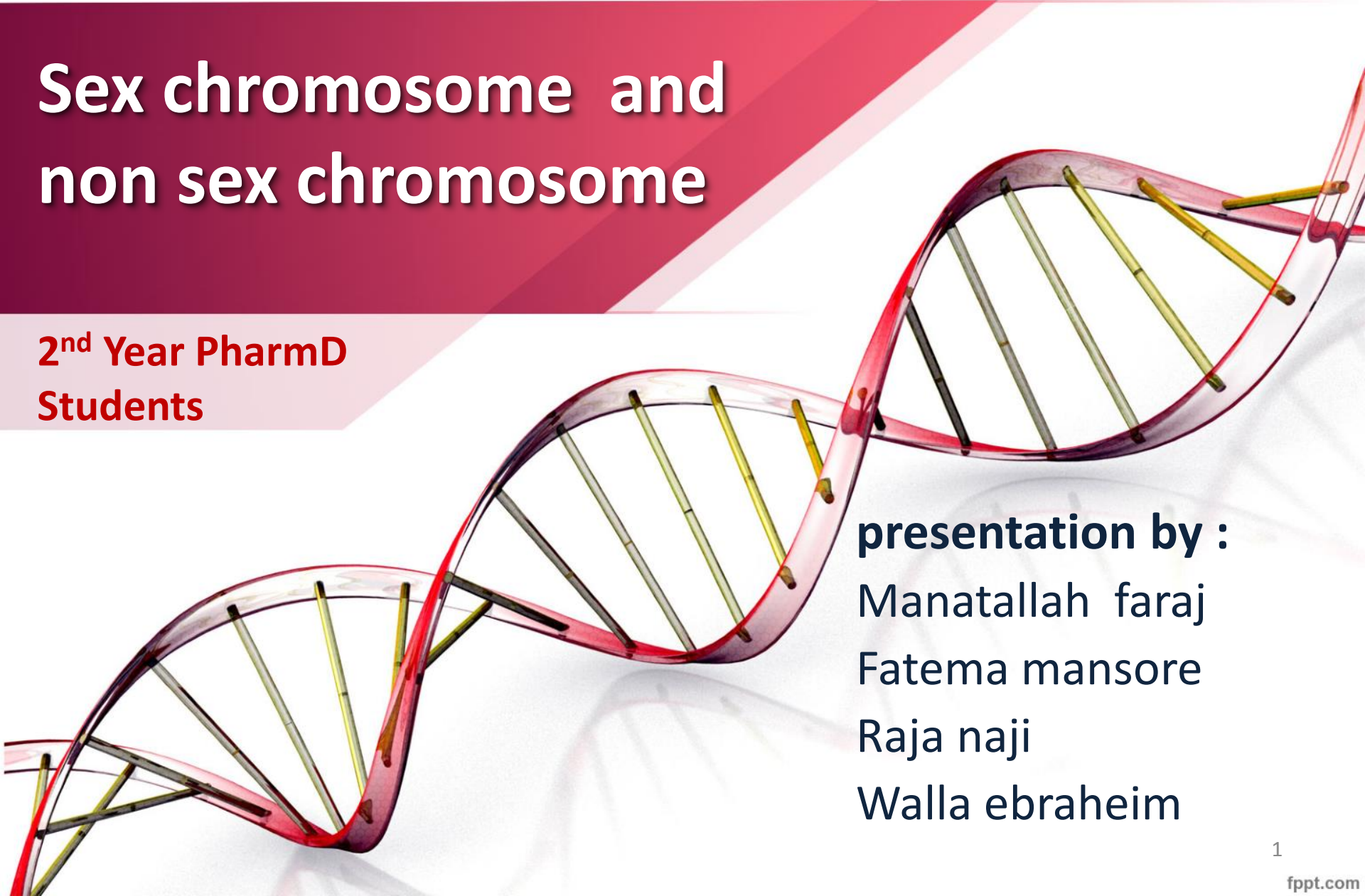


Sex chromosome and non sex chromosome

2nd Year PharmD
Students



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Objective



- 1. Define haploid and diploid and Karyotype.**
- 2. Define bar body.**
- 3. Define Sex and non sex chromosome.**
- 4. How are they represented using letters?**
- 5. Numbers (compare numbers in different organisms).**
- 6. Deficiencies in sex and non-sex chromosome.**



Introduction



- ✓ **What is a the chromosome?**
- **Chromosomes are the rod-shaped filamentous bodies present in the nucleus, which become visible during cell division.**
- **They are the carriers of the gene or unit of heredity.**
- **Chromosome are not visible in active nucleus due to their high water content, but are clearly seen during cell division.**

Define haploid and diploid



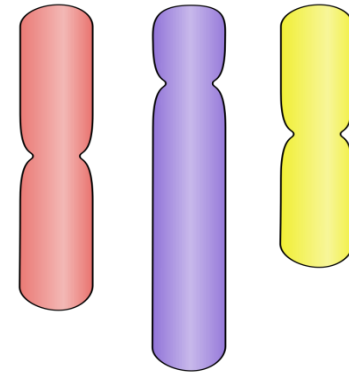
- **Haploid:**

Gametes normally contain only one set of chromosome this number is called haploid .

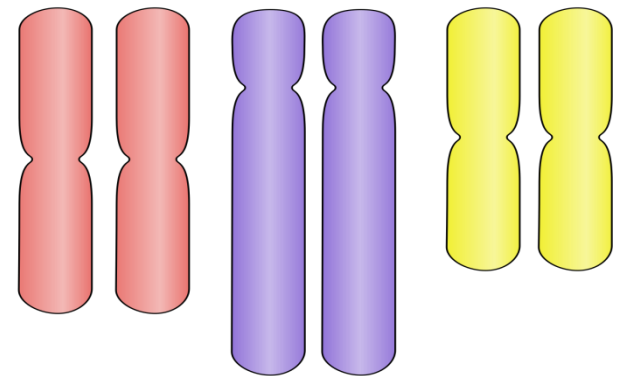
- **Diploid:**

Somatic cells usually contain two sets of chromosome $2n$ diploid.

Haploid (N)



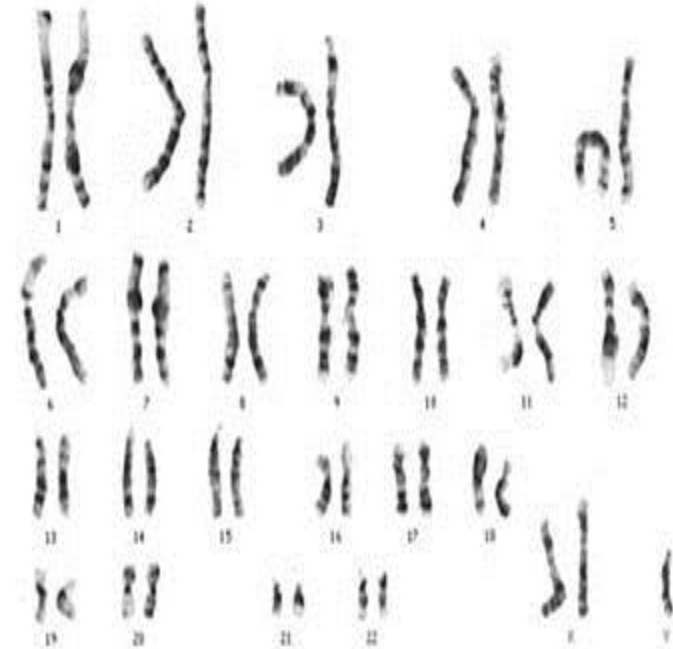
Diploid (2N)



Define Karyotype



- **Karyotype:** is a profile of organisms chromosomes which are organized by their size, pattern and location of centromere.
- The order of chromosomes is done according to the size as it's easier for specialists to find some disorders.



Define bar body



In all of the female somatic cells, which don't take part in sexual reproduction, one of the X chromosomes is active, and the other is inactivated in a process called lionization, becoming the Barr body.

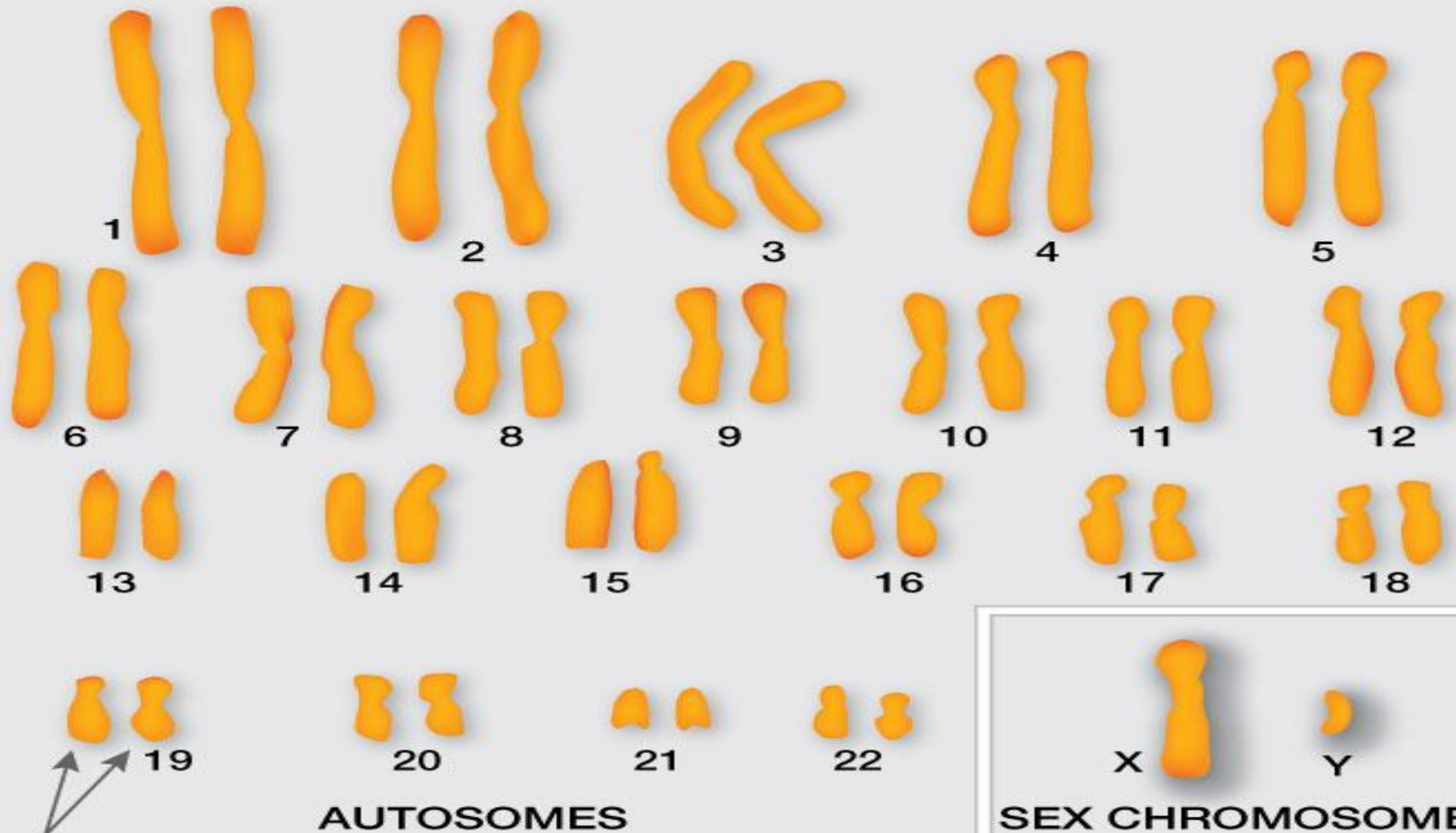
Sex and non sex chromosome .



Autosomes - There are 22 pairs of autosomes in humans. These code for most of the genetic traits in the body.

Gonosomes or sex chromosomes –in humans contain two types of sex chromosomes including X and Y. While males have an X and a Y chromosome, females possess two X chromosomes.





Pair of homologous chromosomes:

- *One from mom and one from dad*
- *Have the same genes arranged in the same order*
- *Slightly different DNA sequences*





How are chromosomes represented using letters?



- In human, there are two forms of sex chromosomes: the X chromosome and Y chromosome. A pair of *X* and *Y* results in a *male* while a combination of *X* and *X* results in a *female*.
- This XX/XY sex-determination system is one of the most familiar sex-determination systems and is applicable in human beings and most other mammals.



Different types of sex determination

	♀	♂
	44 + XX	44 + XY
	76 + ZW	76 + ZZ
	30 + XX	30 + XY OR 15 + X
	22 + XX	22 + X

Comparison of numbers of chromosomes in different organisms



Somatic chromosome number of some common plants and animals

Sr. no	Scientific name	Common name	Chromosome number	
			Somatic	Gametic
1	<i>Homo sapiens</i>	Human	46	23
2	<i>Oryza sativa</i>	Rice	24	12
3	<i>Rattus norvegicus</i>	rat	42	21
4	<i>Pisum sativum</i>	Pea	14	7
5	<i>Daucus carota</i>	Carrot	20	10
6	<i>Allium cepa</i>	Onion	16	8
7	<i>Zea mays</i>	Maize	20	10
8	<i>Apis mellifera</i>	Honey bee	32	16
9	<i>Musca domestica</i>	House fly	12	6
10	<i>Felis domesticum</i>	Cat	38	19
11	<i>Drosophila melanogaster</i>	Fruit fly	8	4
12	<i>Neurospora Crassa</i>	Bread mold	14	7

Sex -linked disorders chromosomal mutations



1. Female Sex Chromosome Abnormalities

- **Turner syndrome:** occurs when females inherit only one X chromosome--their genotype is X0
- **Triple-X syndrome:** occurs in women who inherit three X chromosomes--their genotype is XXX.

Sex -linked disorders chromosomal mutations



2. Male Sex Chromosome Abnormalities

- **Klinefelter syndrome**

Males inherit one or more extra X chromosomes--their genotype is XXY.

- **XYY syndrome**

Males inherit an extra Y chromosome--their genotype is XYY.

Autosomal Disorders Chromosomal Mutations



**Ex: Down Syndrome.
Extra Chromosome 21**



Summary

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- **Concise Oxford Dictionary**
- **a b c White 1973.**
- **Stebbins, G.L. (1950). "Chapter XII: The Karyotype". Variation and evolution in plants. Columbia University Press.**
- **King, R.C.; Stansfield, W.D.; Mulligan, P.K. (2006). A dictionary of genetics (7th ed.). Oxford University Press.**



Thank

you