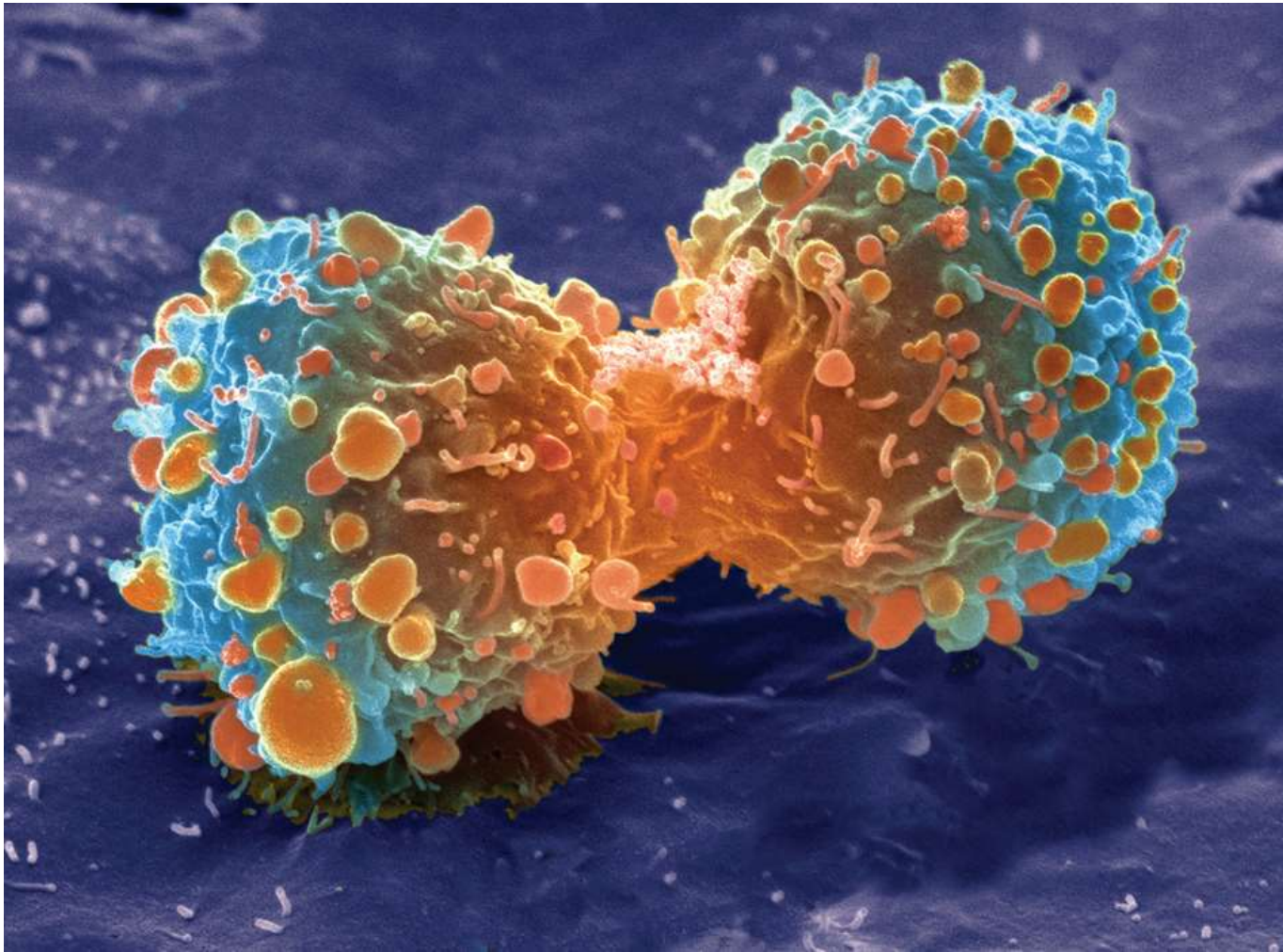


5.1 The Cell Cycle

KEY CONCEPT - Cells have distinct phases of growth, reproduction, and normal functions.

EQ- What are **chromosomes** and how are they organized?



5.1 The Cell Cycle

► What are chromosomes?

- Long pieces of **DNA** contained in the **nucleus of cells**.
- **Thread-like** structures that carry **genetic information**



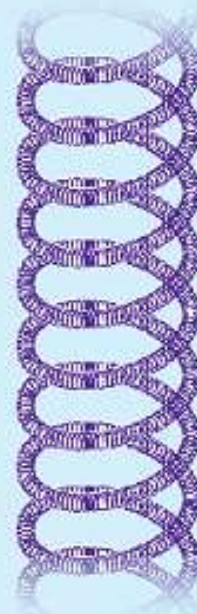
DNA double helix



DNA and histones



Chromatin

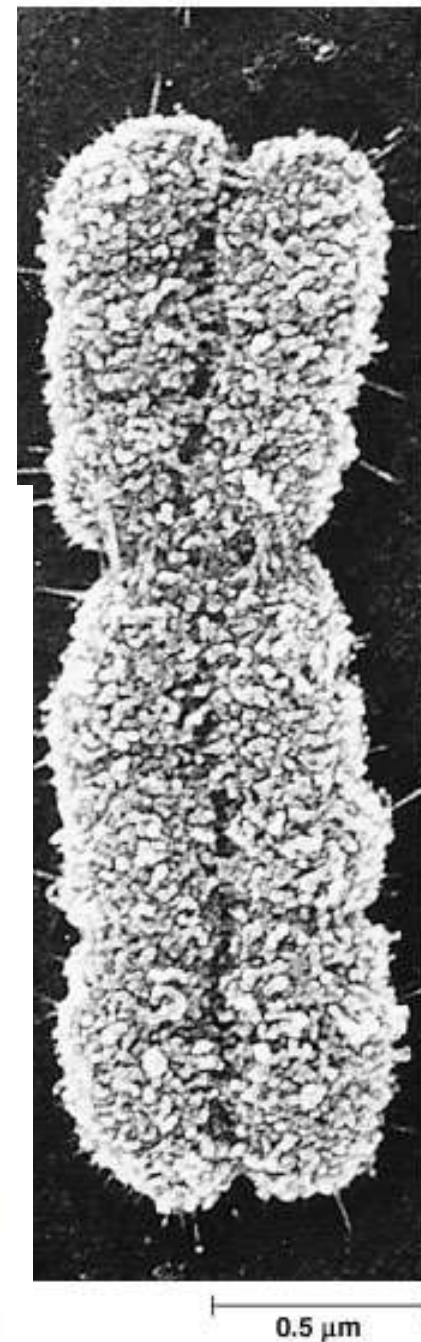
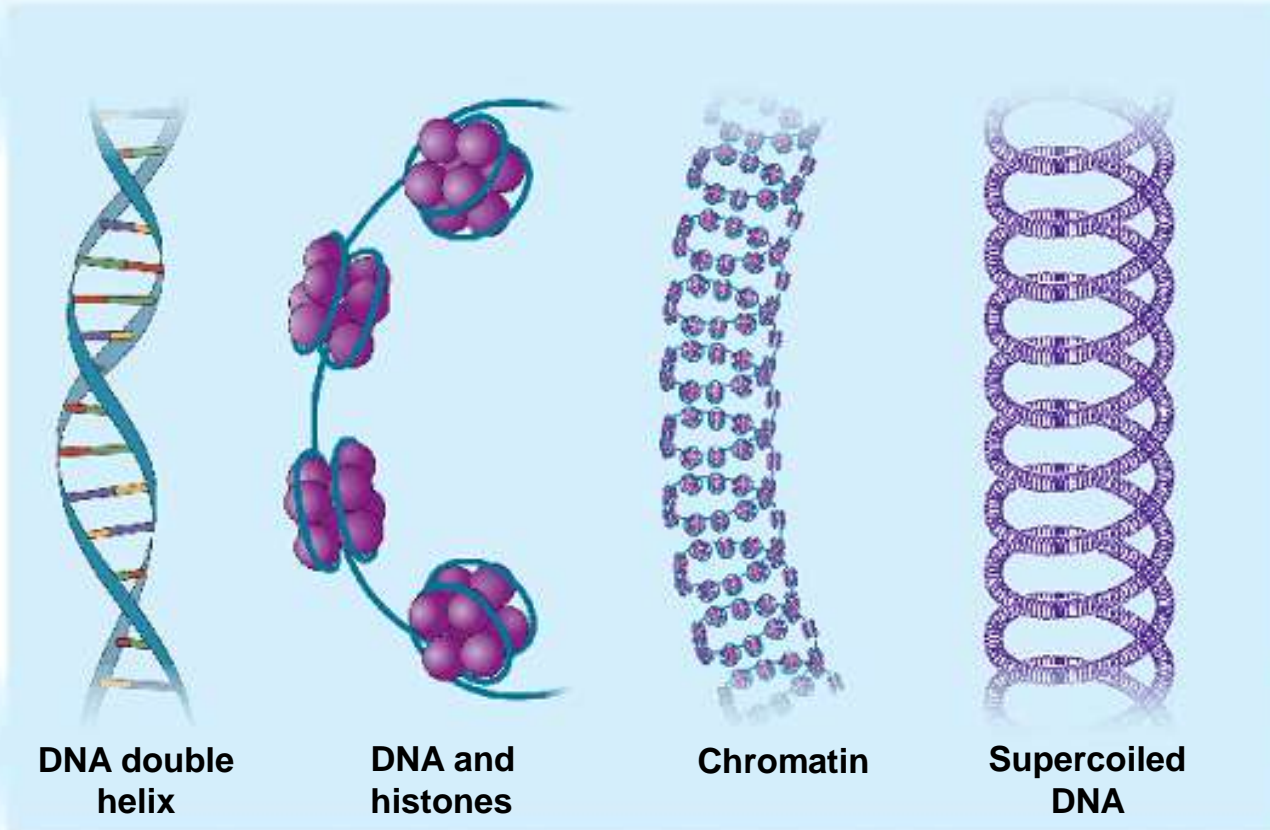


Supercoiled DNA



▶ Location of chromosomes:

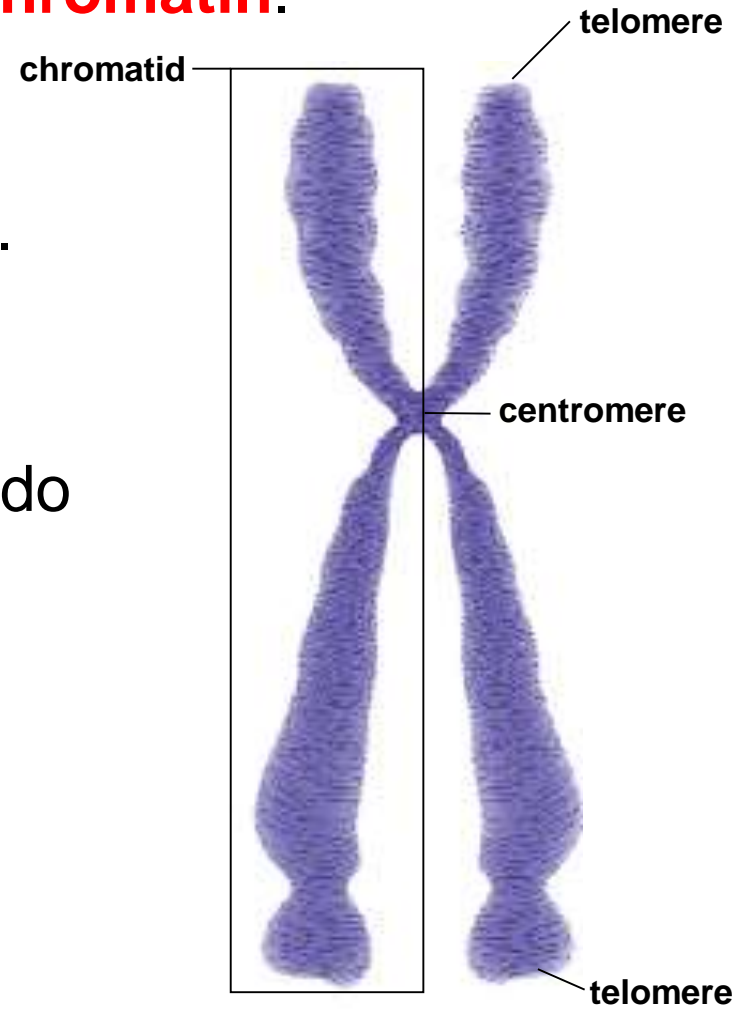
- Chromosomes are located in the **nucleus** of a cell.
- All somatic (body) cells have the same set of chromosomes.
- Chromosomes are **NOT visible** until a cell is



5.1 The Cell Cycle

Chromosome Structure:

- DNA plus proteins is called **chromatin**.
- One half of a *duplicated* chromosome is a **chromatid**.
- Sister **chromatids** are held together at the **centromere**.
- **Telomeres** protect DNA and do not include genes.



Condensed, duplicated chromosome

5.1 The Cell Cycle

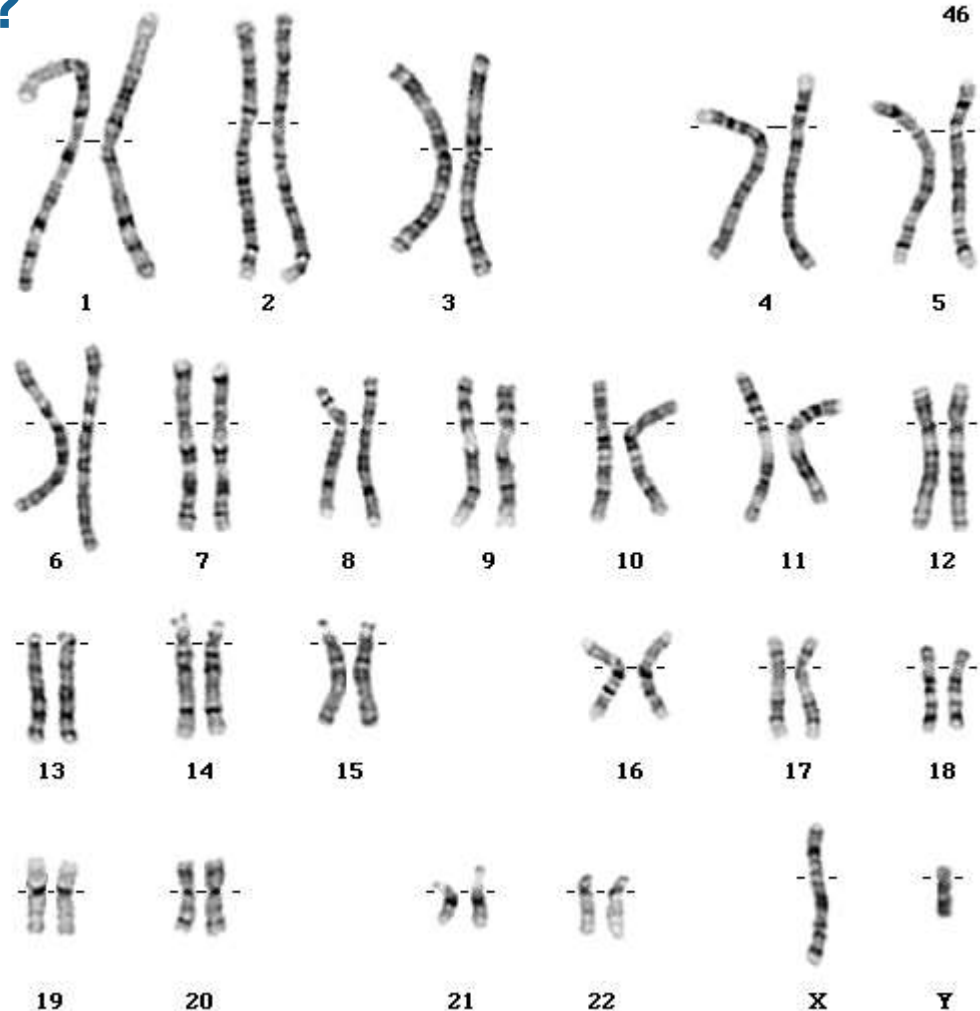
Human Karyotype

▶ How many chromosomes?

- Humans have **46** individual chromosomes (23 pairs)

▶ Types of chromosomes:

- Chromosomes 1-22 are called **autosomes**.
- Chromosome pair 23 are the **sex chromosomes** (XX - female & XY - male)



5.1

Examples of chromosome numbers (diploid).

Species	# of chromosomes
<u>Fruit Fly</u>	8
<u>Guinea Pig</u>	16
<u>Snail</u>	24
<u>Earthworm</u>	36
<u>Cat</u>	38
<u>Pig</u>	40
<u>Mouse</u>	40
<u>Rat</u>	42
<u>Rabbit</u>	44
<u>Syrian hamster</u>	44
<u>Hare</u>	46
<u>Human</u>	46
<u>Ape</u>	48
<u>Sheep</u>	54
<u>Horse</u>	64
<u>Dog</u>	78
<u>Chicken</u>	78
<u>Carp</u>	104
<u>Butterflies</u>	~ 380
<u>Fern</u>	~ 1200



5.1 The Cell Cycle

- **Diploid vs. Haploid**

- **Haploid**: HALF the total number of chromosomes in an organism. (n)

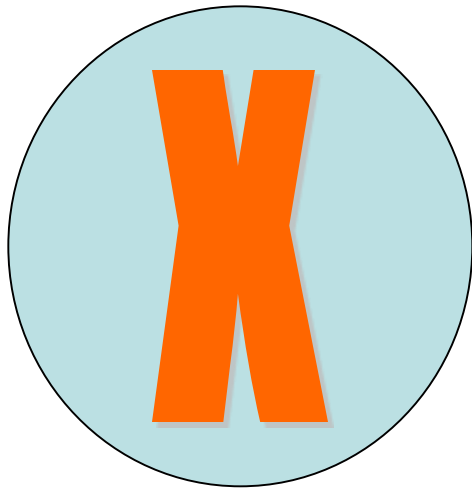
= haploid cell
 n

Human $n = 23$

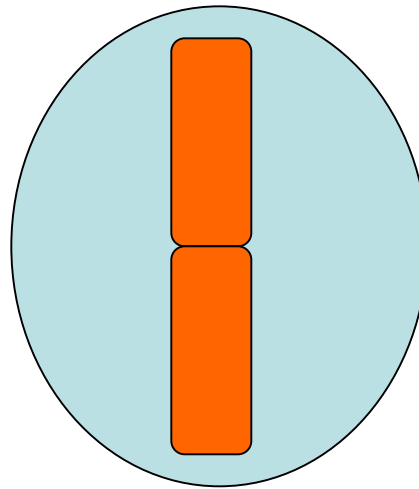
- **Diploid**: the TOTAL number of chromosomes in an organism. ($2n$)

= diploid cell
 $2n$

Human $2n = 46$



or



or

