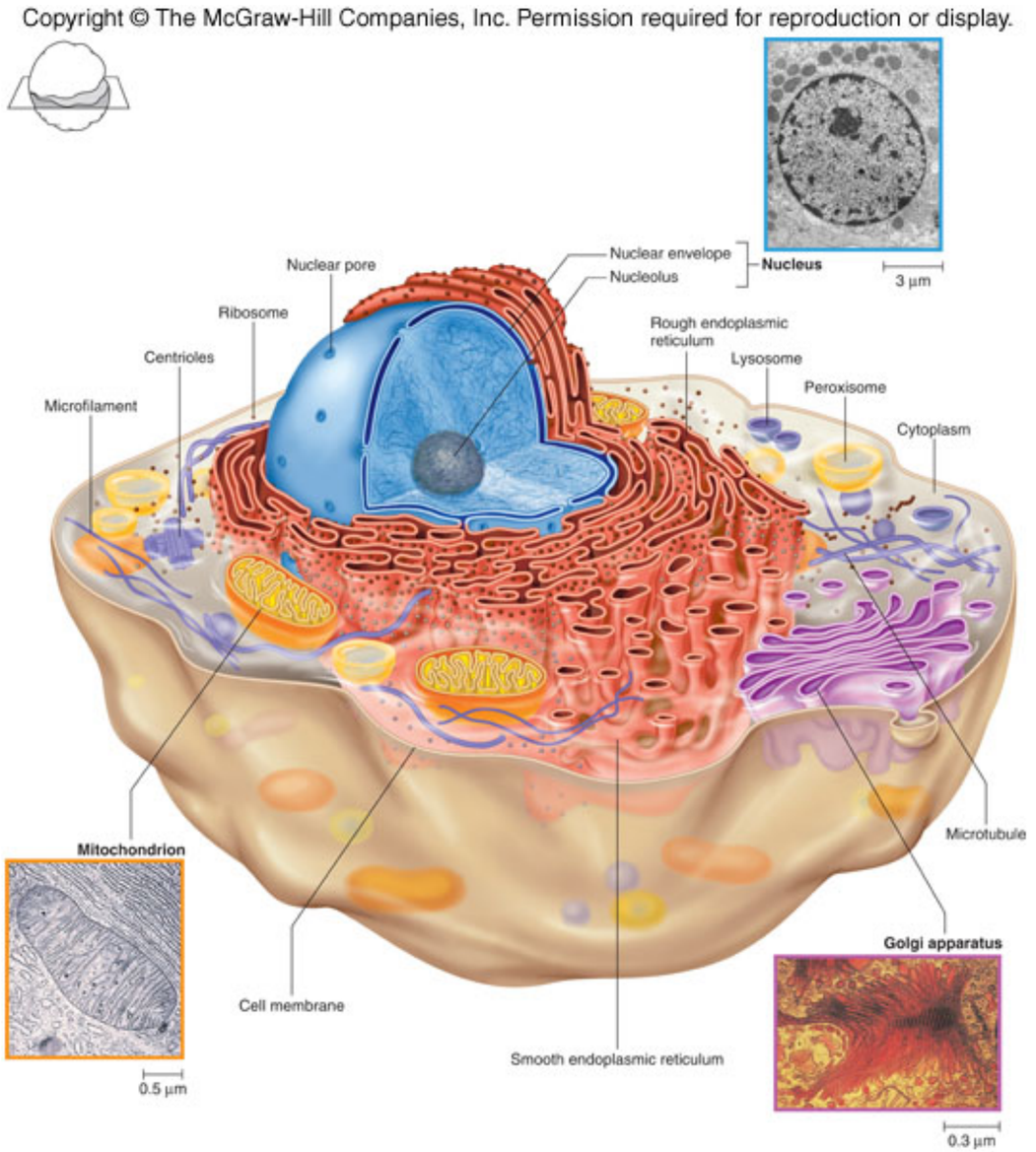
Organelles

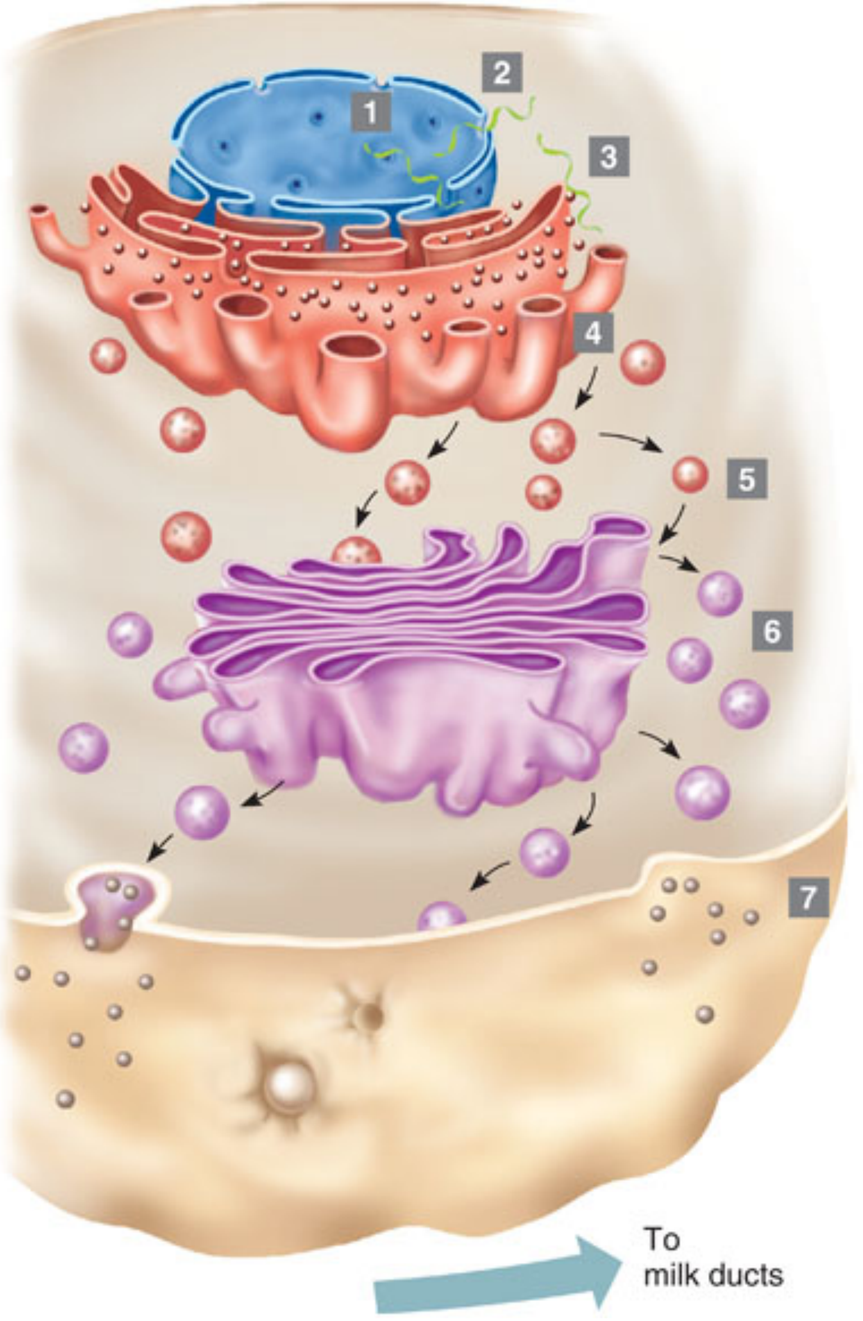
- Compartmentalise a cell's activities
- Keep reactions isolated from one another
- Increase efficiency in the cell
- Types of function
    1. Secrete substance e.g. protein
    2. Digest debris
    3. Extract energy



Parts of a Cell Song: https://www.youtube.com/watch?v=NkC9AiJf7gI

Organelles

- **Genes** provide instructions for building.
- **Nucleus** protect DNA from degradation.
- **Endomembrane system** (e.g. ER, Golgi apparatus, lysosomes) house unique enzymes that process proteins.
- **Vesicles** are small packages of proteins & other molecules surrounded by membrane.
- **Lysosomes** contain digestive enzymes.



1 Milk protein genes transcribed into mRNA

2 mRNA exits through nuclear pores

3 mRNA forms complex with ribosomes and moves to surface of rough ER where protein is made

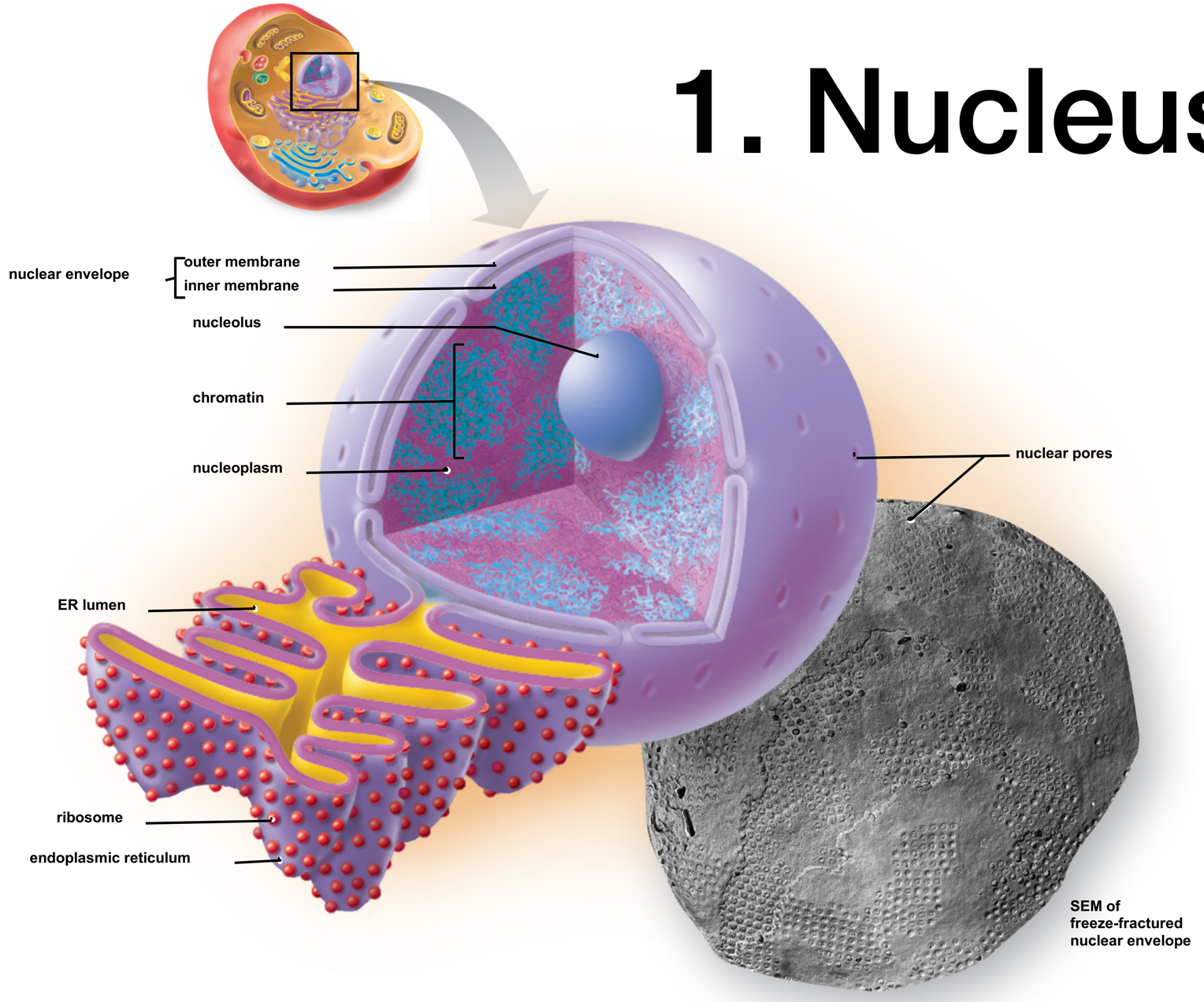
4 Enzymes in smooth ER manufacture lipids

5 Milk proteins and lipids are packaged into vesicles from both rough and smooth ER for transport to Golgi

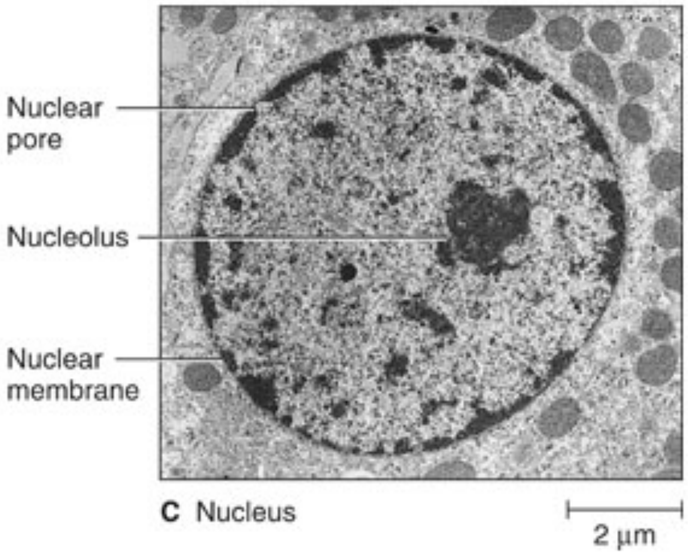
6 Final processing of proteins in Golgi and packaging for export out of cell

7 Proteins and lipids released from cell by fusion of vesicles with cell membrane

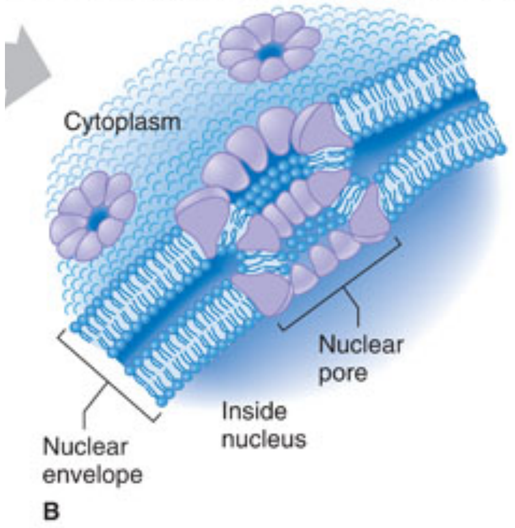
1. Nucleus



1. Nucleus



- Storage of **genetic information**: DNA (Deoxyribonucleic acid) are organised into genes which specify a polypeptide.
- **Nucleolus:** where ribosomal RNA (rRNA) is made.
- A two layered **nuclear envelope** that separates the nucleus from the cytoplasm.
- **Nuclear pores** contain highly specialised channels, composed of more than 100 types of proteins, with millions molecules passing in or out every minute, e.g. protein and mRNA.



- **Chromatin**

  - DNA is packed with histone protein that, prior to cell division, condense to form chromosomes.

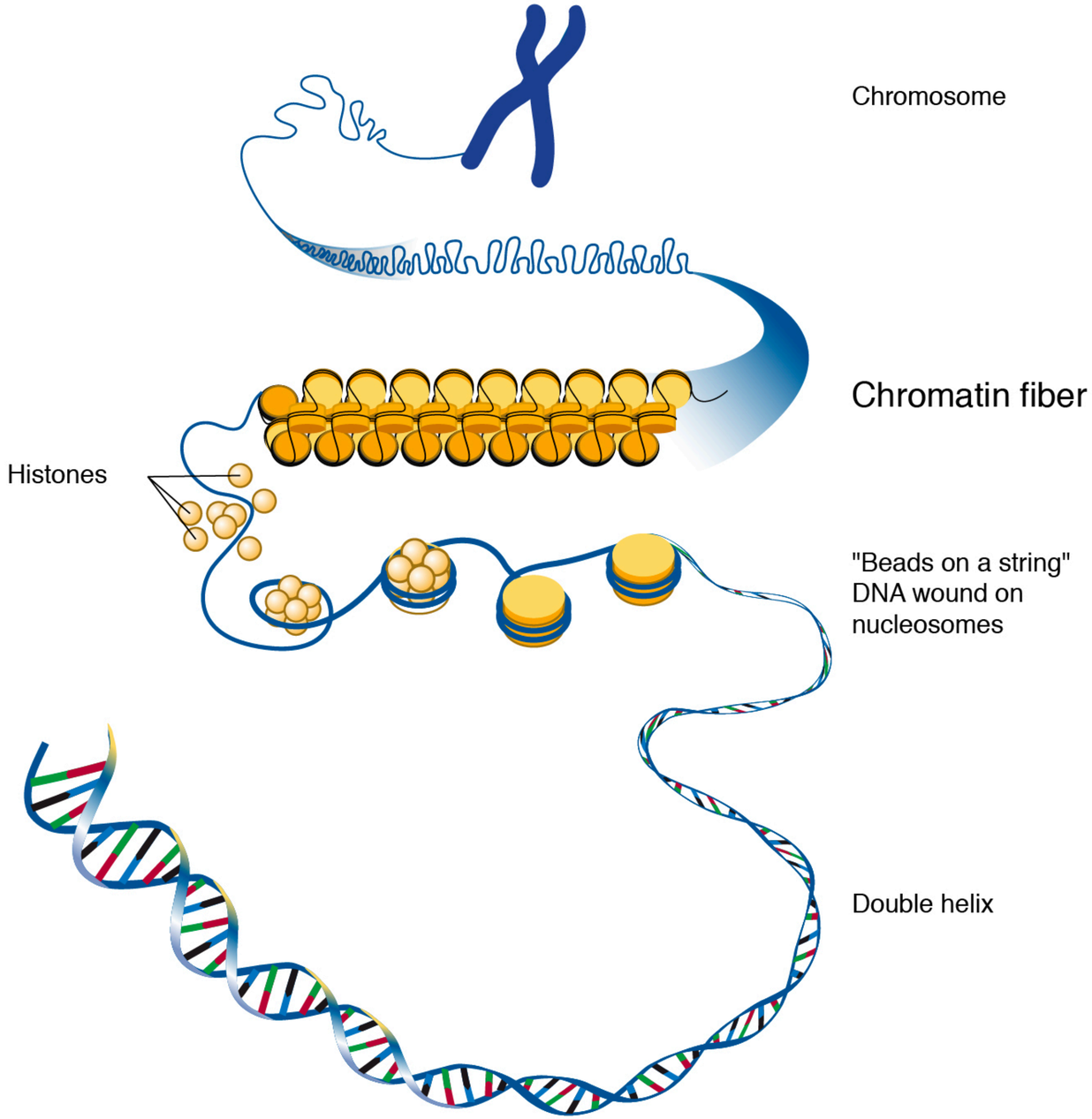


Image: https://www.genome.gov/genetics-glossary/Chromatin

How packed are DNA?

- Nucleus: 6 um in diameter
- ~10% of cell volume (the largest organelle in animal cells)
- ~3.2 billion nucleotides in 23 chromosomes.
- 2 meters of DNA if stretched from end to end.

Ref: https://www.ncbi.nlm.nih.gov/books/NBK26834/