

BIOLOGY I

- 1. Cell Theory
- 2. Cell Organelles
- 3. DNA and chromosomes



VIDEO

https://www.youtube.com/watch?v=4OpBylwH9DU&ab_channel=TED-Ed

THE CELL THEORY

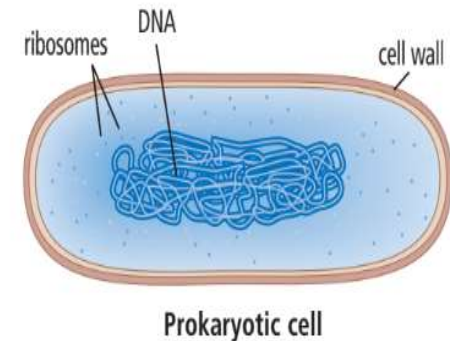
The Cell Theory is considered one of the main ideas of modern biology. It contains three main ideas:

1. The cell is the basic unit of life
2. All organisms are composed of one or more cells
3. All cells come from other living cells

There are two major groups of cells.

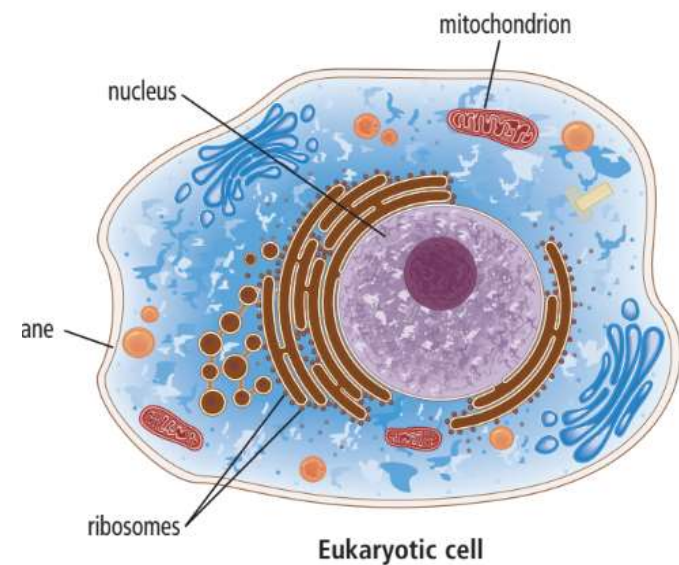
PROKARYOTIC CELLS

- These are a type of cell whose organelles are not surrounded by membranes. These cells do not have a nucleus, instead they generally have a single piece of circular, double stranded DNA located in the cell.
- Example: Bacteria

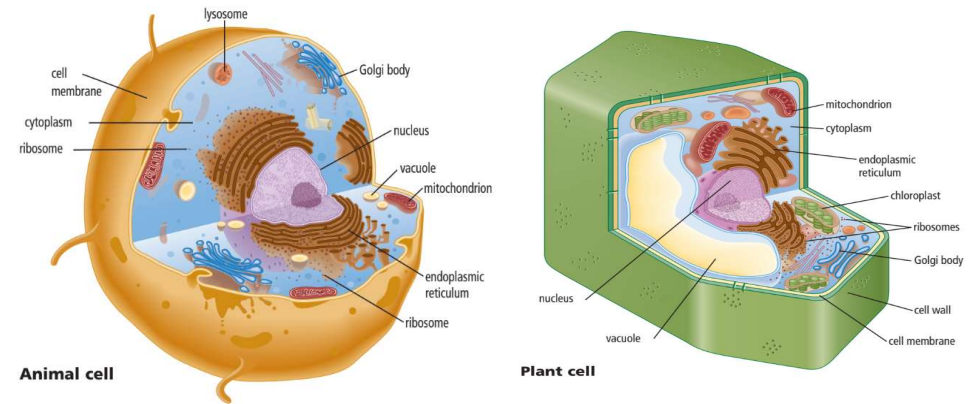


EUKARYOTIC CELLS

- These are cells whose organelles are surrounded by membranes. These cells do contain a membrane bound nucleus which contains the DNA.
- Example: Plant and animal cells



ORGANELLES



Classified as being a type of eukaryotic cell, plants and animal cells contain several organelles that carry out several functions to ensure the cell's survival.

An organelle is a cell structure where functions are carried out to ensure the cell's survival. Organelles take up about 5 – 30% of a cell. The rest of the cell consists of water.

Cell Organelle	Function (Role)	Is it in an animal and/or plant cell?
Nucleus	Stores <u>DNA</u> ; the <u>control center</u> of the cell (tells other organelles what to do)	<u>Animal and plant cells</u>
Mitochondria	<u>Energy producers</u> ; they carry out <u>cellular respiration</u> (when chemical energy from the food we eat is changed into energy that our cells use) to produce energy	<u>Animal and plant cells</u>
Cell membrane	A <u>membrane</u> that separates the inside contents of the cell with the outside environment	<u>Animal and plant cells</u>
Cytoplasm	Jelly-like substance that contains <u>organelles</u> , <u>water</u> , and other life-supporting materials	<u>Animal and plant cells</u>

Cell Organelle	Function (Role)	Is it in an animal and/or plant cell?
Cell wall	Tough, rigid structure that surrounds the cell membrane; <u>protects</u> the cell	<u>Plant cells</u>
Chloroplast	Trap <u>energy</u> from the <u>sun</u> and change it into <u>chemical</u> energy	<u>Plant cells</u>
Ribosome	Assemble <u>proteins</u> (the building blocks for structures in the cell)	<u>Animal and plant cells</u>
Endoplasmic Reticulum	Network of membrane covered channels; <u>protein</u> is <u>transported</u> through here from the ribosome to the Golgi body	<u>Animal and plant cells</u>

Cell Organelle	Function (Role)	Is it in an animal and/or plant cell?
Golgi Body	<u>Sorts protein</u> and packs them into vesicles	<u>Animal and plant cells</u>
Vacuole	<u>Storage</u> compartments (often stores waste)	<u>Animal and plant cells (much larger in a plant cell)</u>
Vesicle	Carry <u>proteins, nutrients,</u> and <u>water</u> into, out of, and around the cell	<u>Animal and plant cells</u>
Lysosome	<u>Break down</u> and recycle organelles	<u>Animal and plant cells</u>



VIDEO

https://www.youtube.com/watch?v=8llzKri08kk&ab_channel=AmoebaSisters

RANK...

Rank the following organisms with how closely they match up with a human's DNA:

- Cow
- Banana
- Fruit Fly
- Dog
- Gorilla
- Mouse

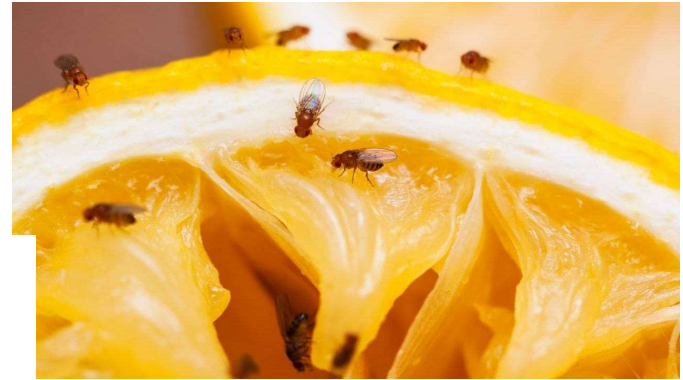
WHAT PERCENTAGE OF DNA DO HUMANS SHARE WITH OTHER ORGANISMS?



Cows
80%



Bananas
60%



Fruit Flies
61%

WHAT PERCENTAGE OF DNA DO HUMANS SHARE WITH OTHER ORGANISMS?



Gorillas
98.4%



Mice
90%

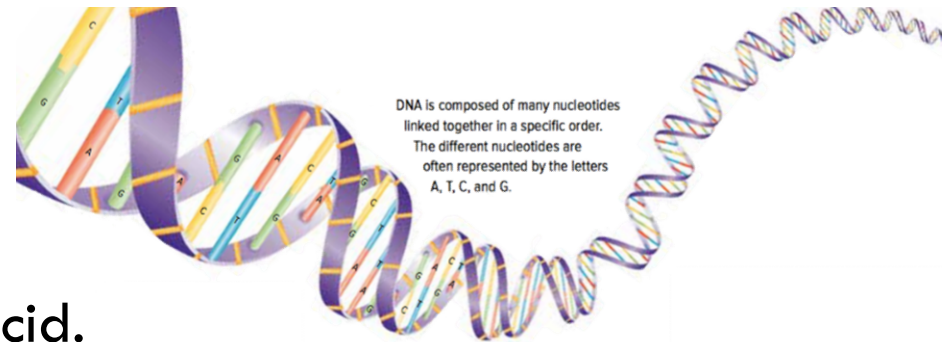


Dogs
84%

VIDEO

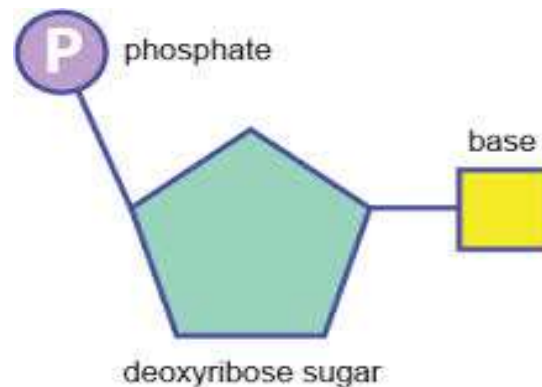
<https://www.youtube.com/watch?v=IbY122CSC5w>

WHAT IS DNA?



DNA stands for deoxyribonucleic acid.

- Stores the genetic information of an organism
- Genetic information determines how an organism looks, functions, and behaves



A nucleotide is the basic building block of DNA.

A nucleotide consists of 3 parts: Phosphate, deoxyribose sugar, and a base

STRUCTURE OF DNA

- Two long strands shaped like a twisted ladder called a double helix
- Consists of many copies of chemical building blocks called nucleotides. There are 4 different versions of a nucleotide and they all differ by the type of base that they have. The four types of bases are: adenine (A), thymine (T), cytosine (C), guanine (G)
- DNA sequence: The specific order of nucleotides; the “code” that holds the genetic information

STRUCTURE OF DNA

- One strand of DNA is going to bond with the other strand of DNA to create a double stranded structure. These strands bond by the nitrogenous bases that bond with Hydrogen bonds in which certain bases can only bond with certain bases.
 - A bonds with T
 - C bonds with G

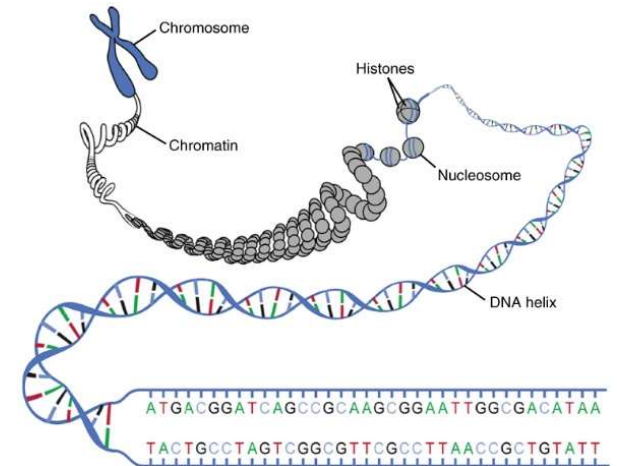
STRUCTURE OF DNA

Strand one: A C T G A T G G C T A

Strand two: T G A C T A C C G A T

FUNCTION OF DNA

- Stores the genetic information of an organism
- An organism's DNA is stored in each of its cells
 - DNA molecules coil and compact into a condensed form called chromatin to fit into the cells
 - Just before reproduction: DNA condenses further into structures called chromosomes
 - During reproduction: Copies of chromosomes (and therefore DNA) are transferred to the offspring



FUNCTION OF DNA

The DNA code can be read and translated into different compounds called amino acids.

3 nucleotides (called a codon) are needed to make one amino acid.

Amino acids can then be combined together to create different types of proteins. Proteins are complex molecules that are able to perform critical roles in the body.

- Example: antibodies are able to bind to foreign particles (like viruses and bacteria) to help protect the body
- Example: enzymes are able to carry out a number of chemical reactions in the body

	T	C	A	G			
T	TTT } phe	TCT } ser	TAT } tyr	TGT } cys	T		
	TTC } phe		TCC } ser	TAC } tyr	TGC } cys	C	
	TTA } leu		TCA } ser	TAA } stop	TGA } stop	A	
	TTG } leu		TCG } ser	TAG } stop	TGG } trp	G	
C	CTT } leu	CCT } pro	CAT } his	CGT } arg	T		
	CTC } leu		CCC } pro		CAC } his	CGC } arg	C
	CTA } leu		CCA } pro		CAA } gln	CGA } arg	A
	CTG } leu		CCG } pro		CAG } gln	CGG } arg	G
A	ATT } ile	ACT } thr	AAT } asn	AGT } ser	T		
	ATC } ile		ACC } thr	AAC } asn	AGC } ser	C	
	ATA } ile		ACA } thr	AAA } lys	AGA } arg	A	
	ATG } met		ACG } thr	AAG } lys	AGG } arg	G	
G	GTT } val	GCT } ala	GAT } asp	GGT } gly	T		
	GTC } val		GCC } ala		GAC } asp	GGC } gly	C
	GTA } val		GCA } ala		GAA } glu	GGA } gly	A
	GTG } val		GCG } ala		GAG } glu	GGG } gly	G