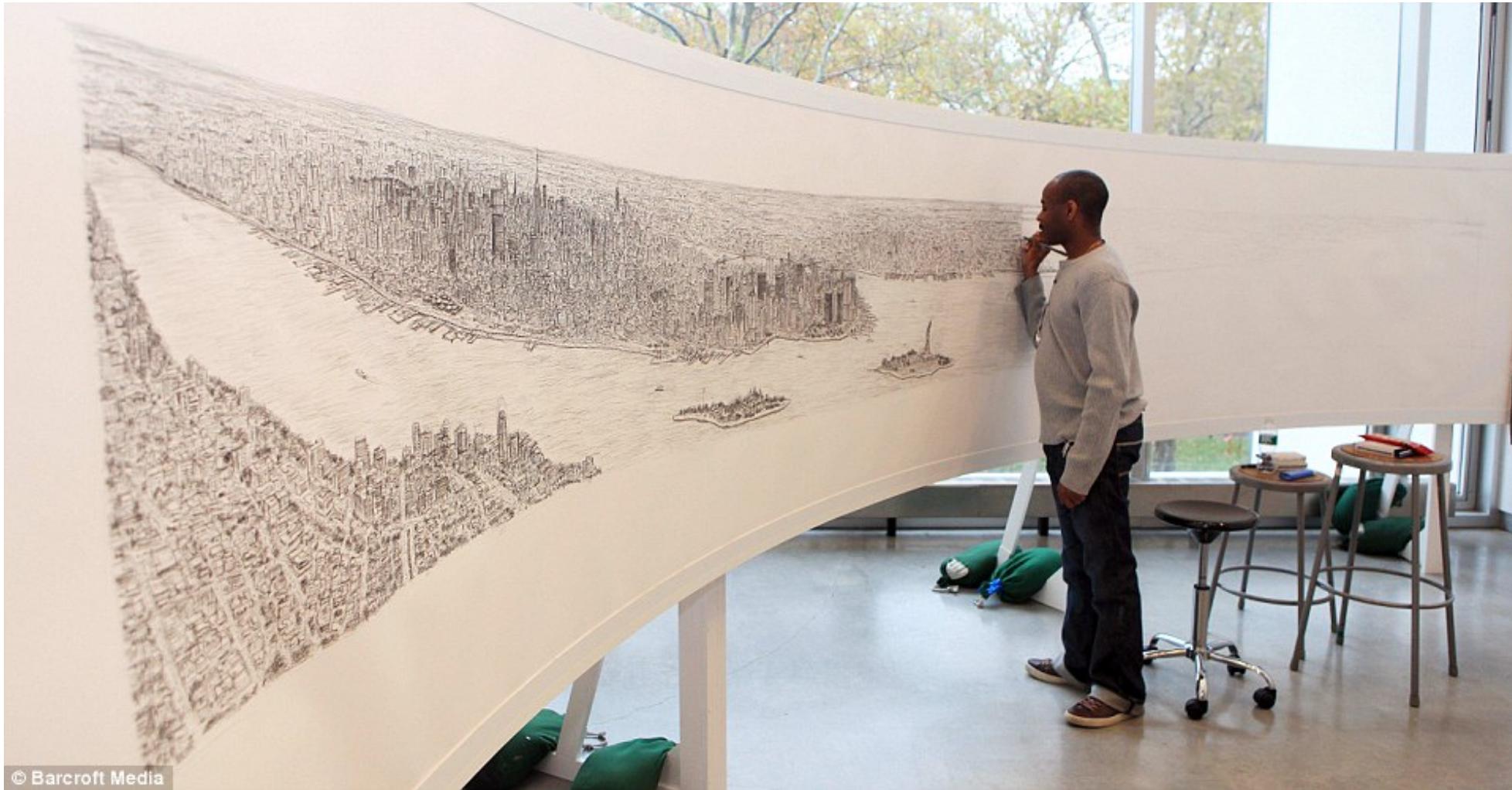


What is DNA?

Molecular biology Introduction

2 minutes on metacognition: mental models



Stephen Wiltshire – 18Ft Panorama of NYC Skyline
Memorized after 20 min helicopter ride

2 minutes on metacognition: mental models

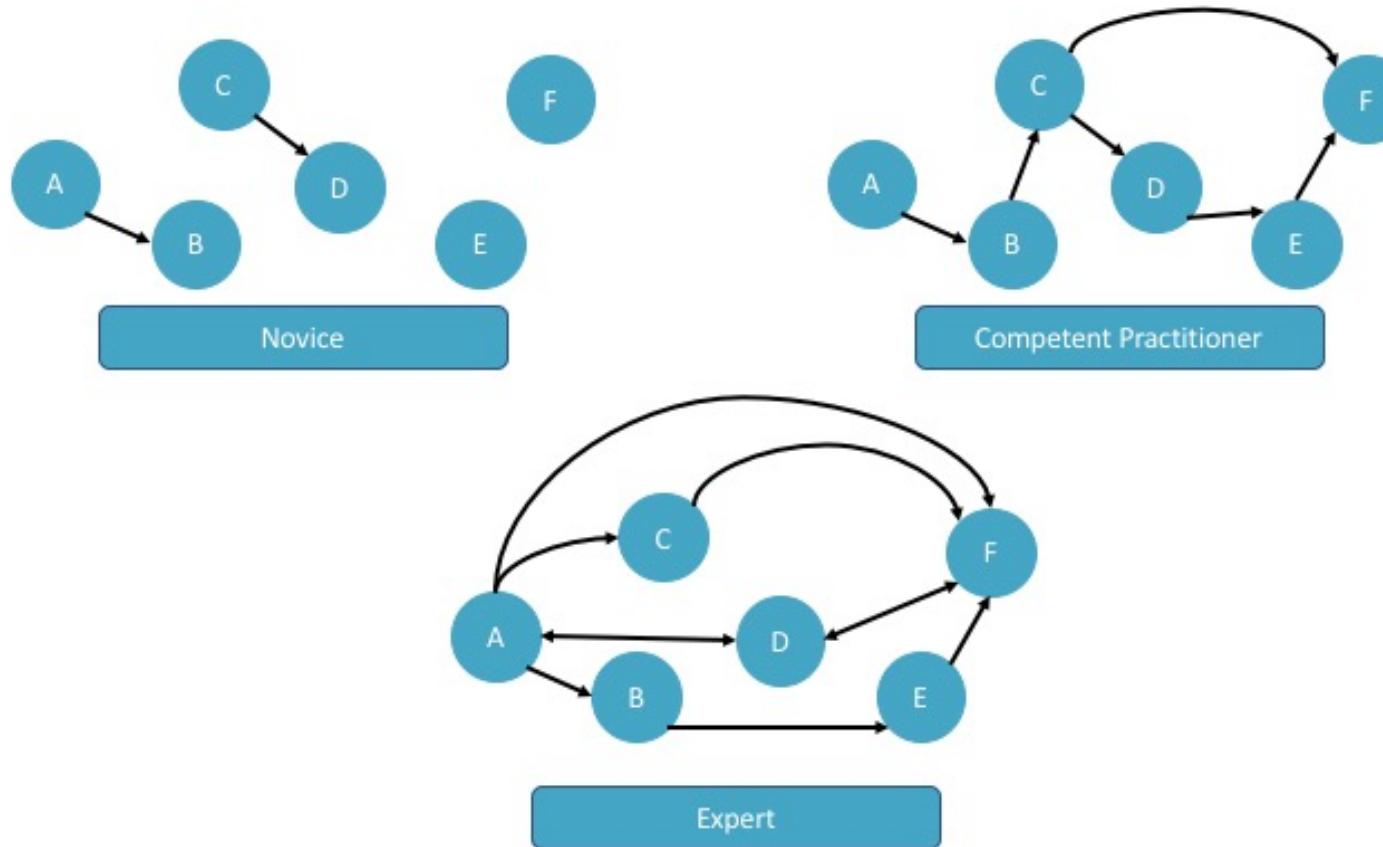


© Barcroft Media



© Alamy

2 minutes on metacognition: mental models



As we learn, we make new connections

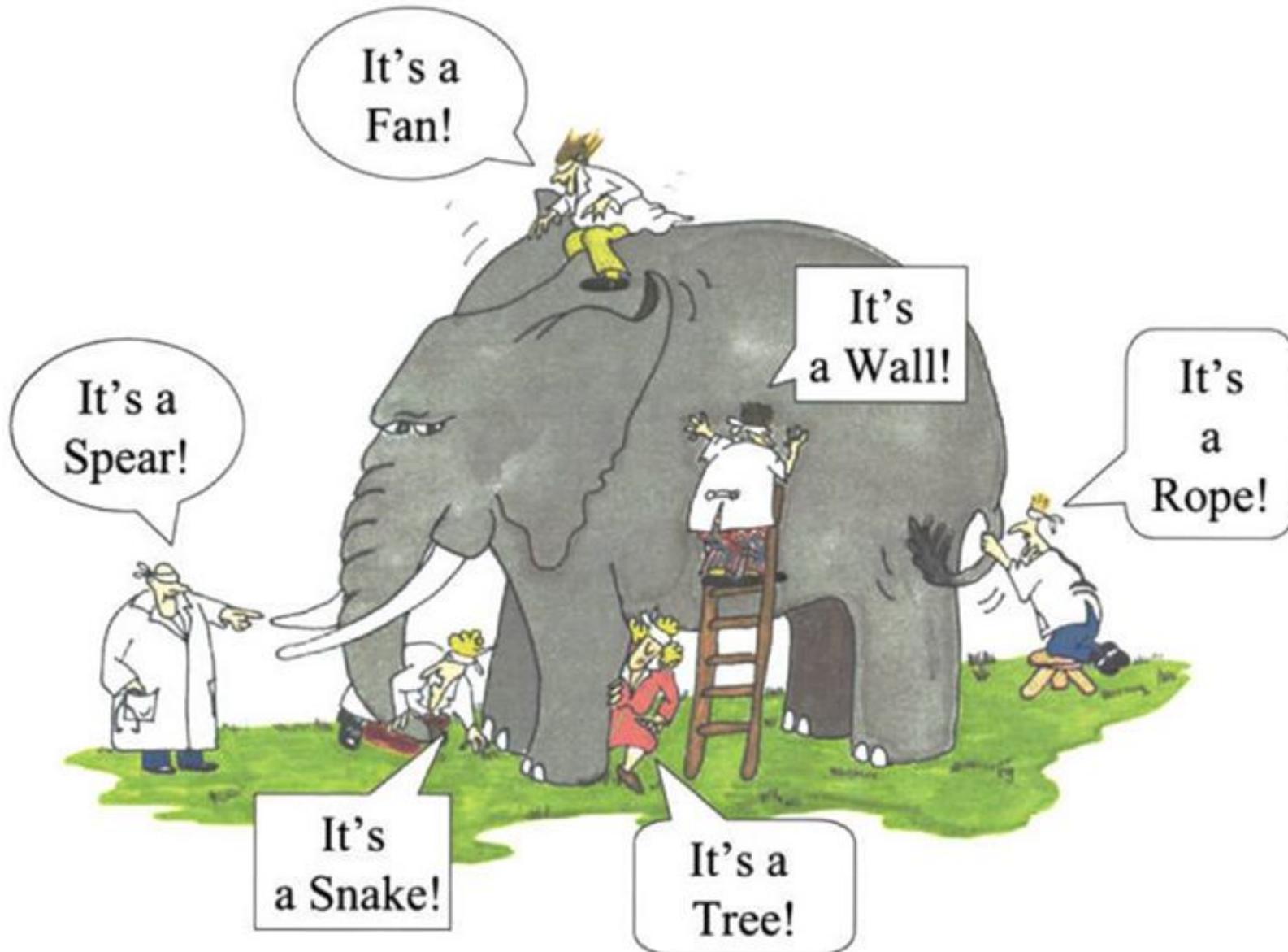
Warning

These slides contain more information than you may need to know

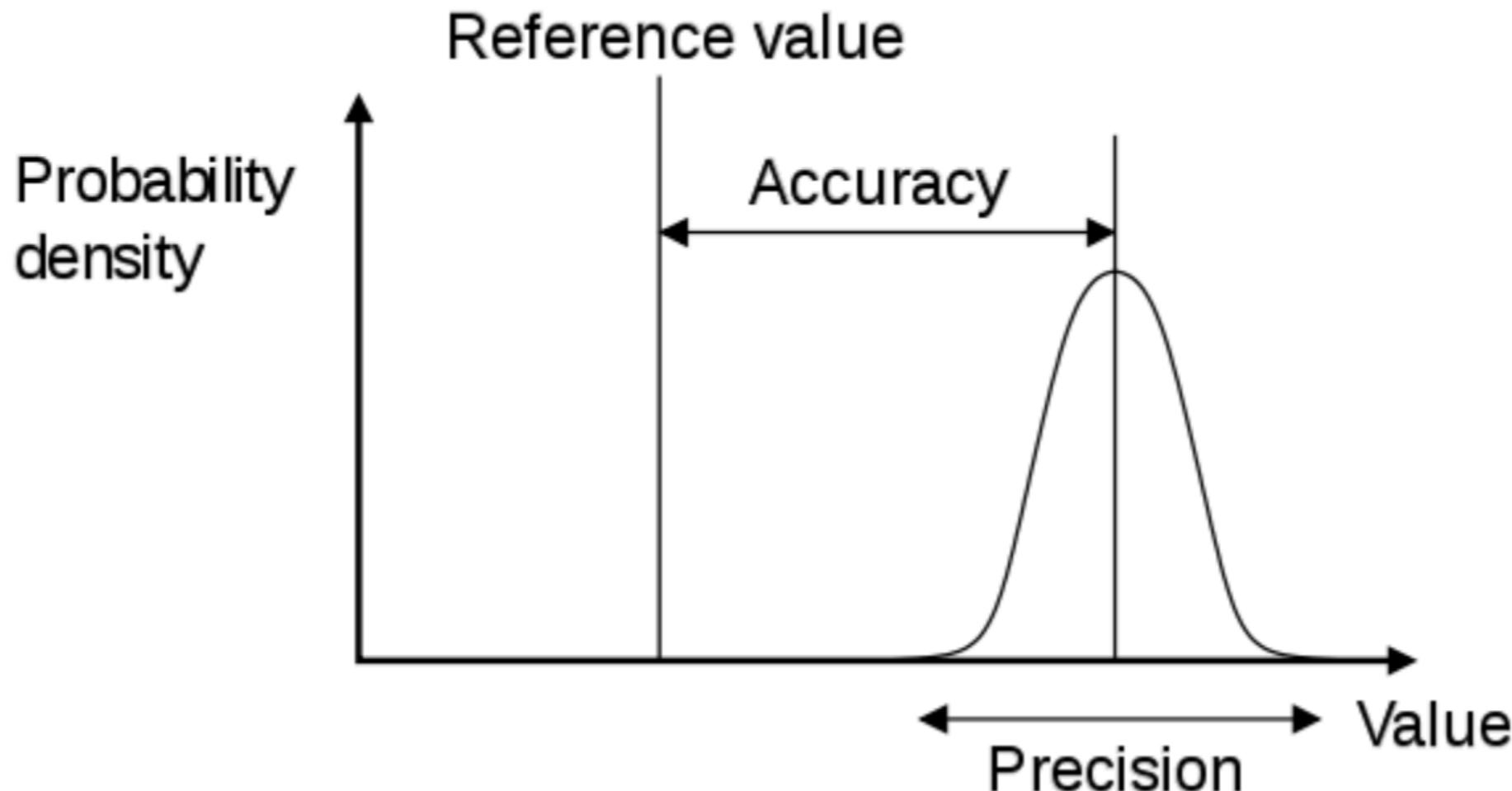
- Don't worry about memorizing details just yet
- For any material that will be on quiz, you will be alerted to review
- Instead see how much you know, try to pick out themes/concepts, what is interesting to you

What is DNA?

Like most questions – its all about how you look at it

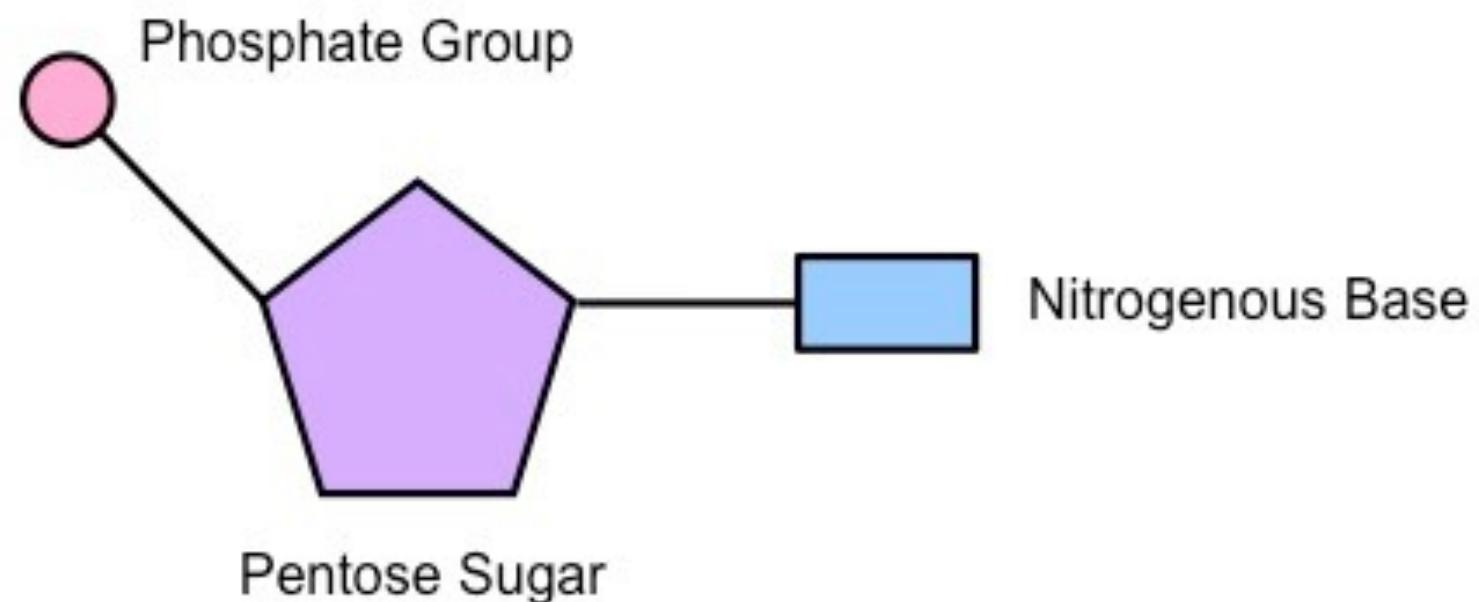


Like most questions – its all about how you look at it

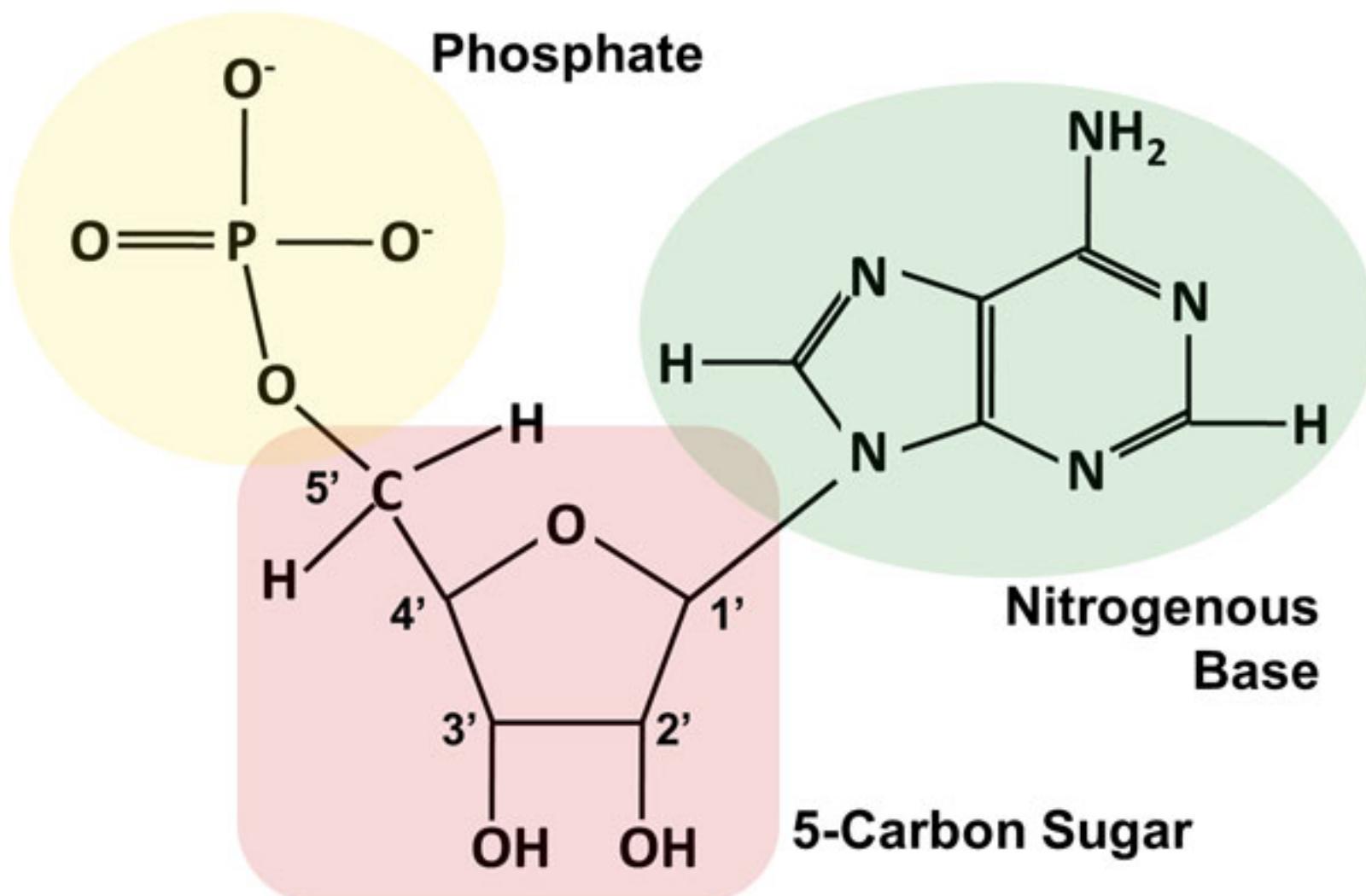


What a Chemist Sees
(atoms/organic chemistry)

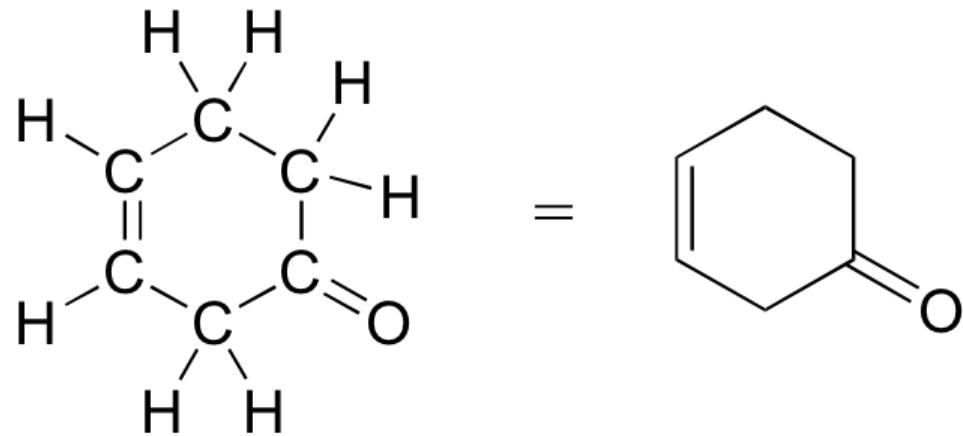
Nucleotide (AKA Base)



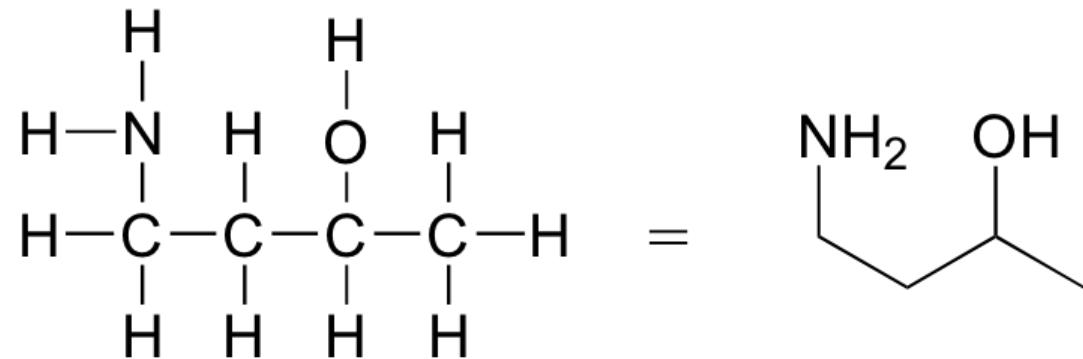
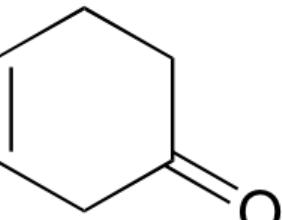
Nucleotide (AKA Base) – Atomic Detail



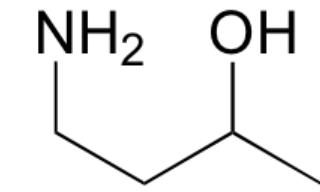
Drawing molecules in organic (carbon-based) chemistry



=

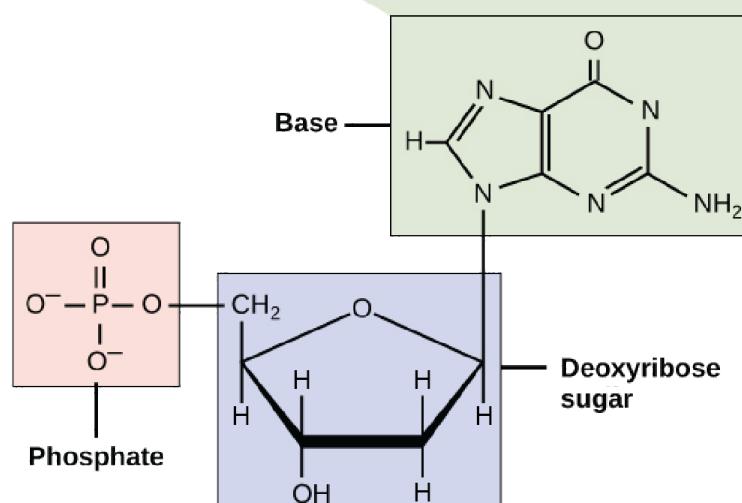
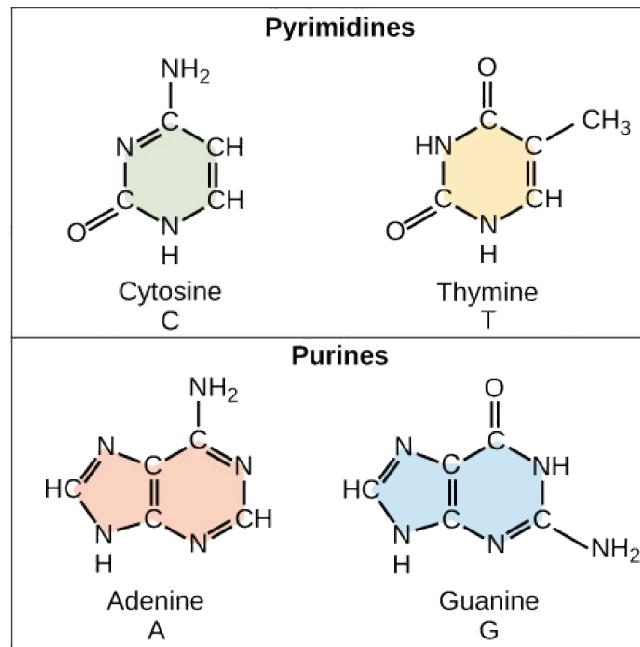


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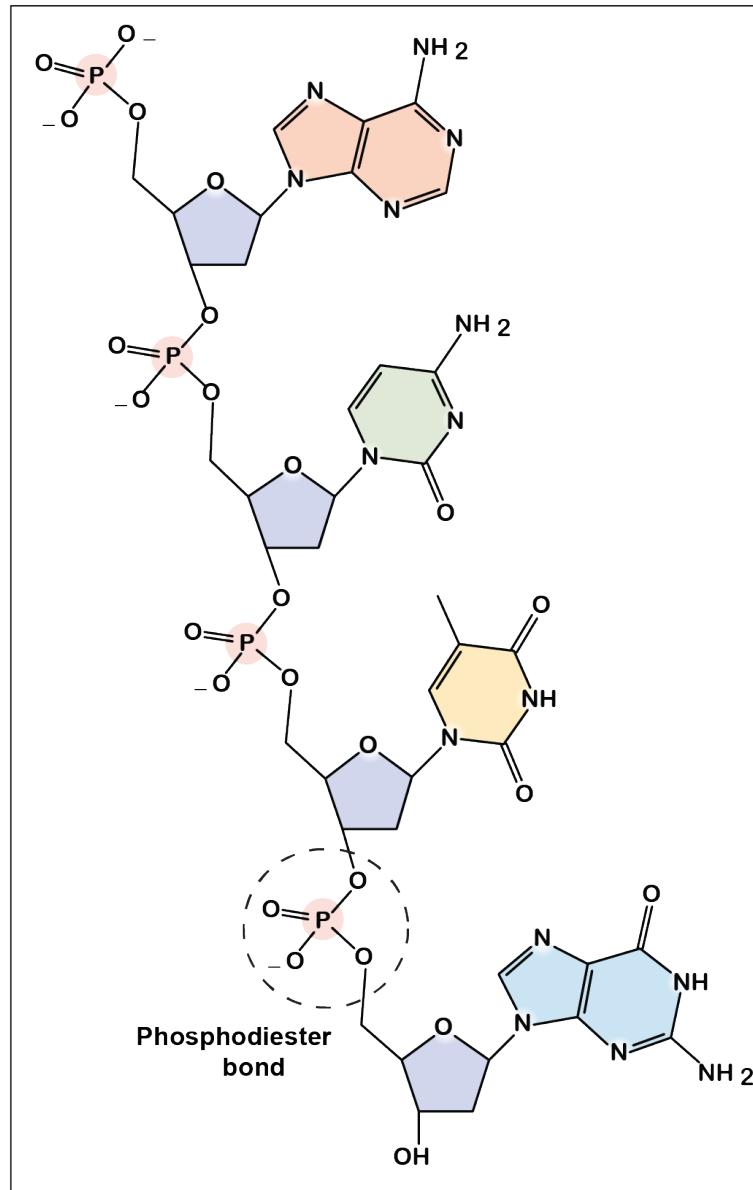


- Every (corner) represents a carbon molecule
- Lines represents bonds (two lines (=) is double bond)
- We don't draw hydrogens (too many)

DNA is made from four bases (A, C, T, G)

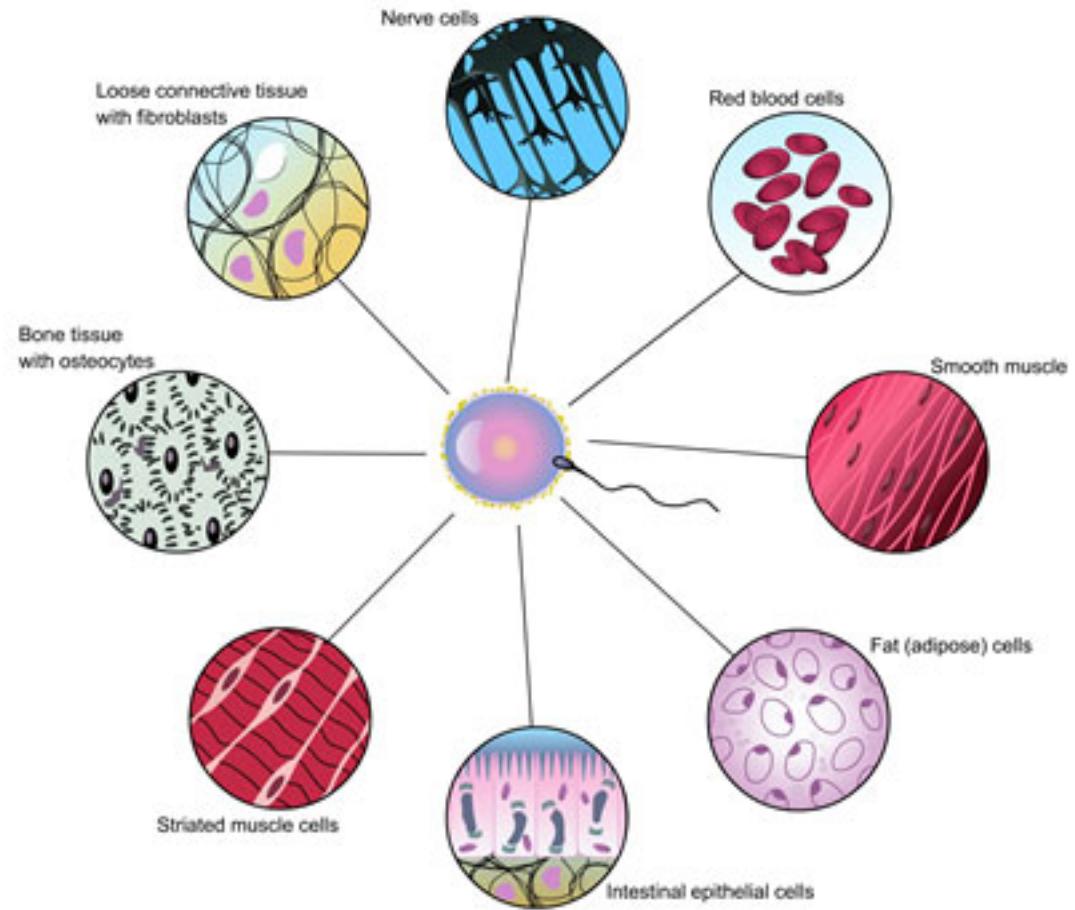
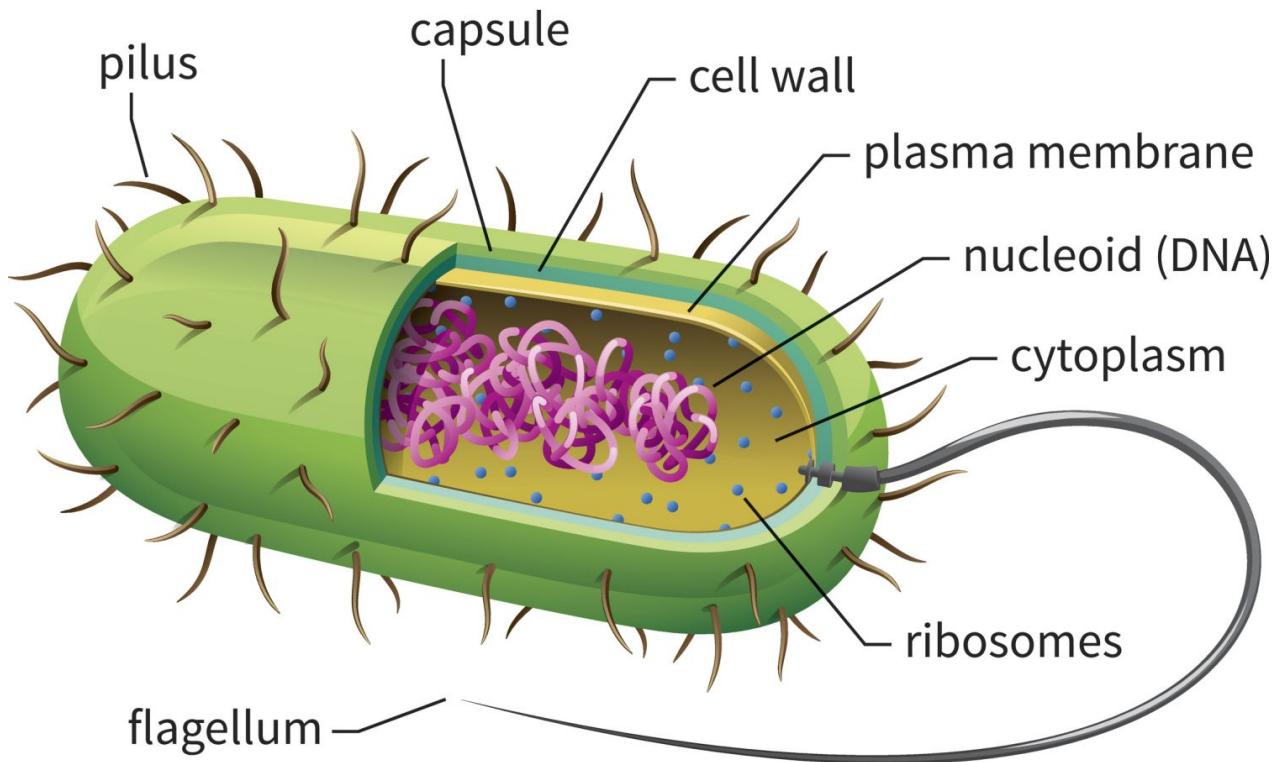


Bases are linked (and ordered)



What an organism sees
(biological function)

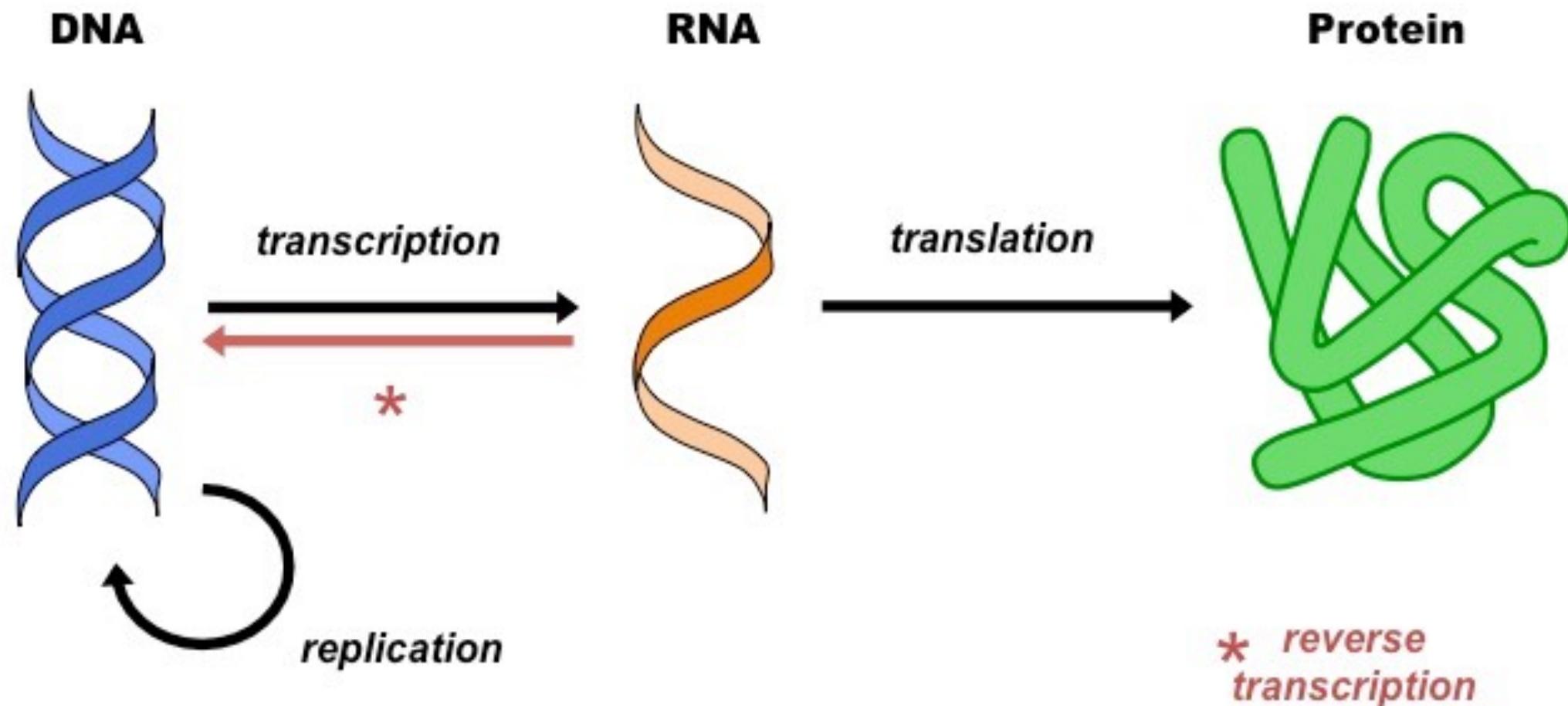
Organisms may be uni or multicellular



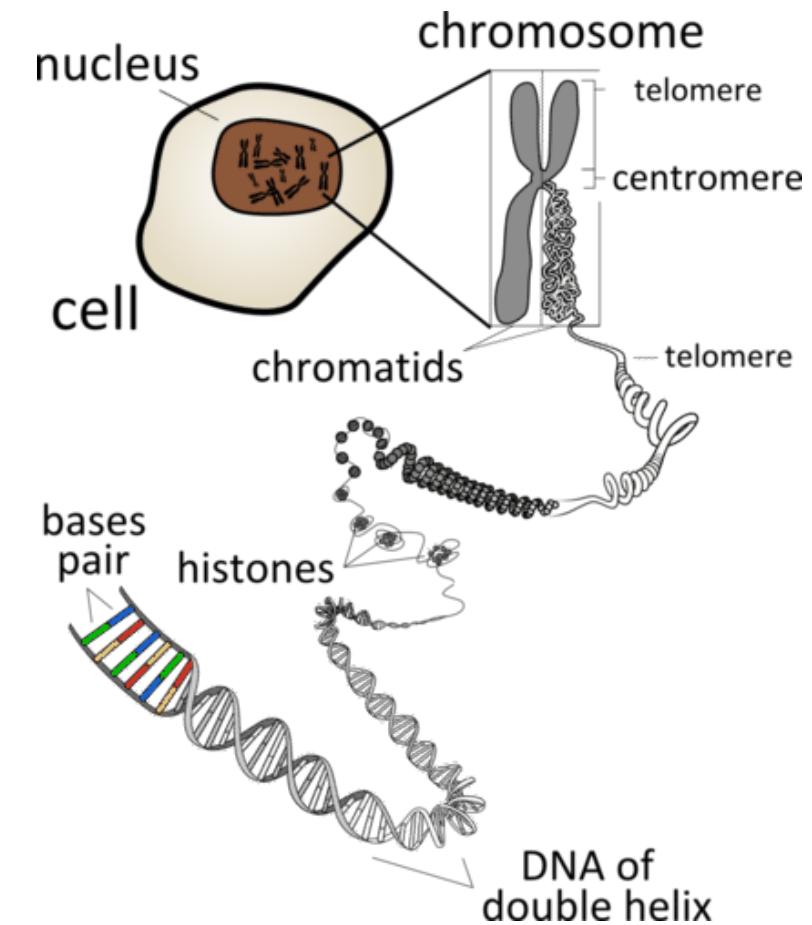
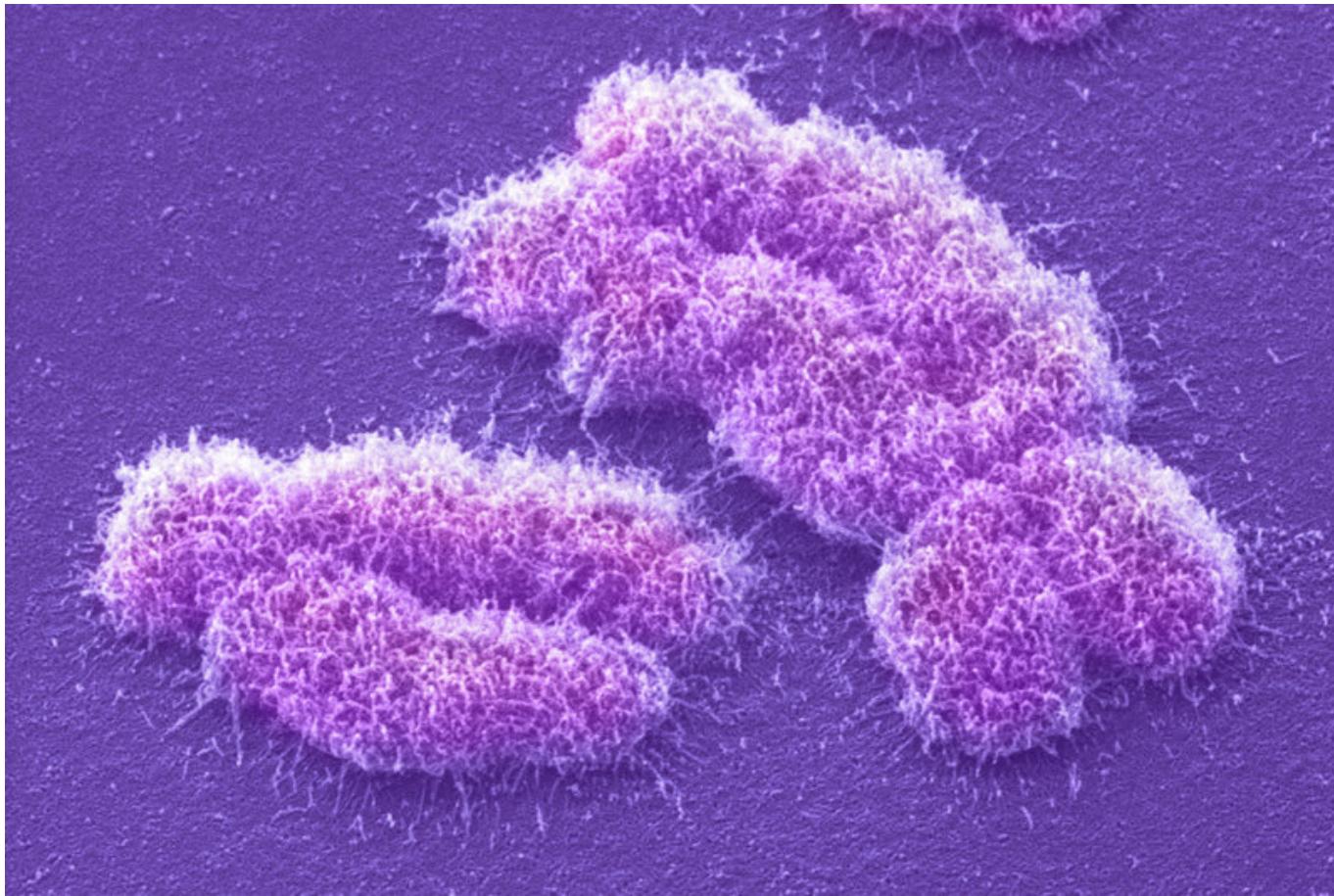
Bacterial cell: <https://www.thoughtco.com/prokaryotes-meaning-373369>

Cell specialization: <https://www.sensebusiness.co.uk/2019/09/gcse-biology-cell-specialization.html>

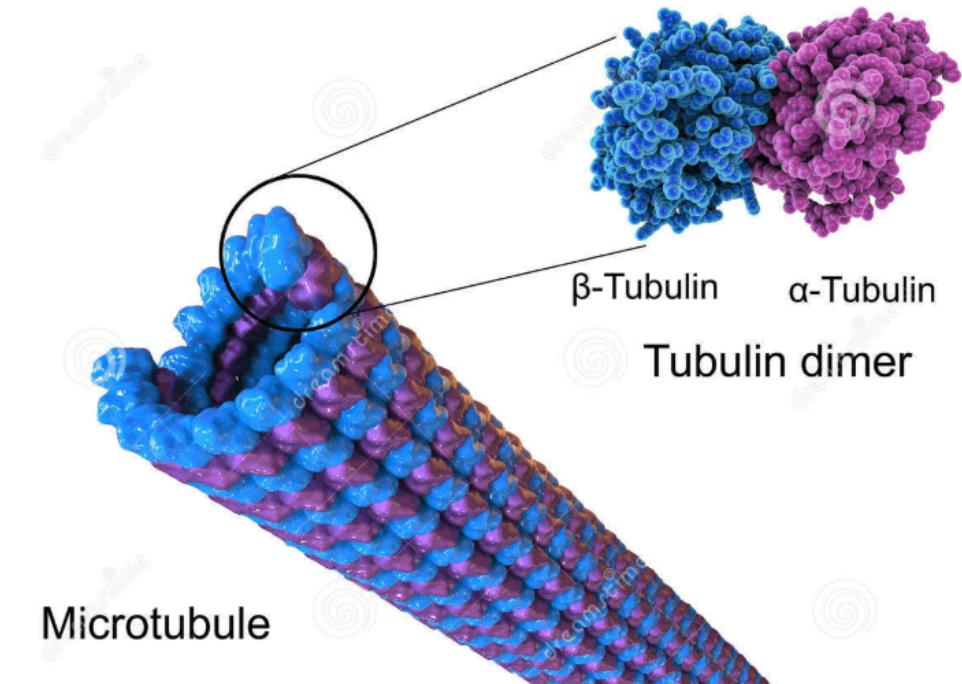
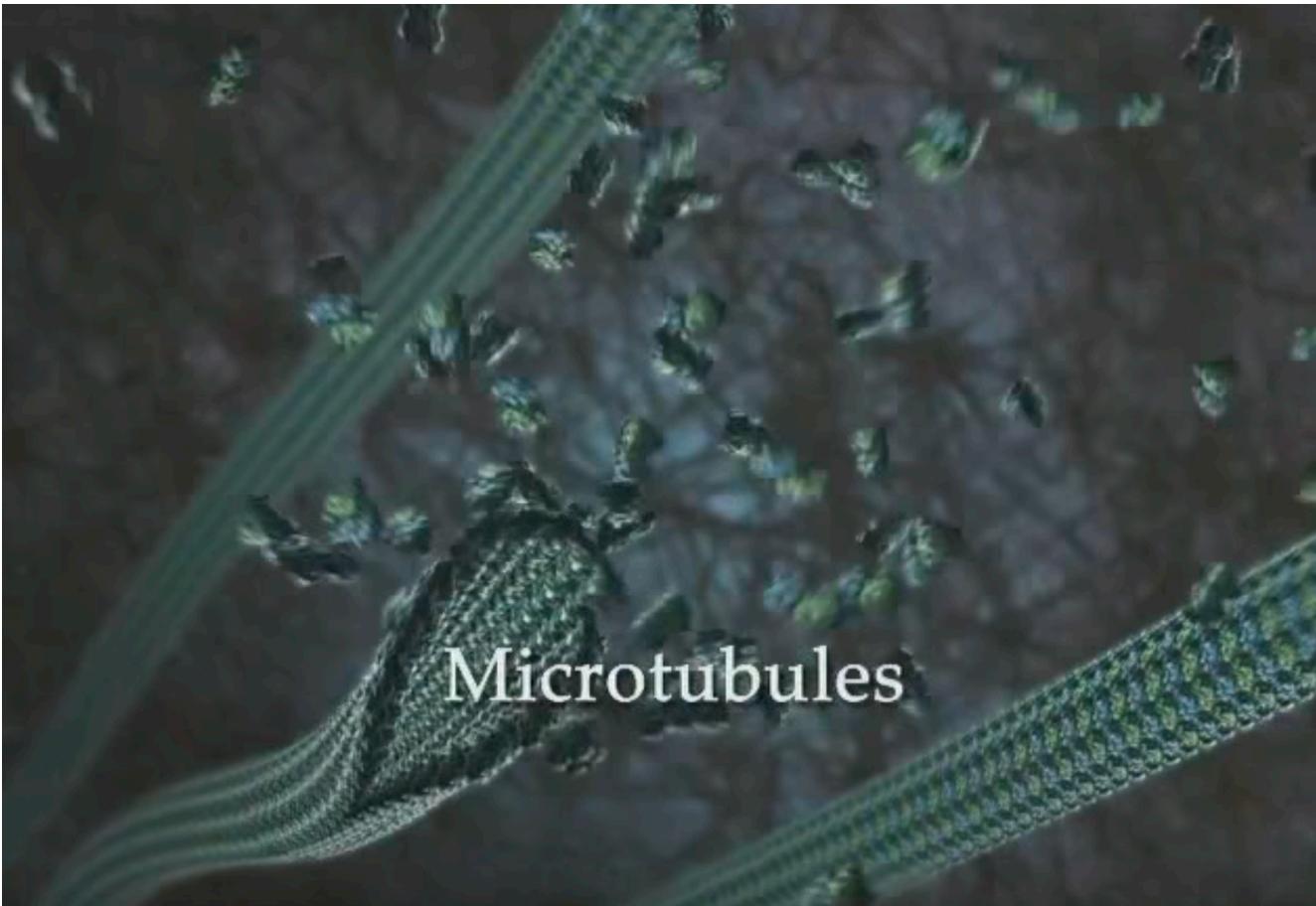
DNA contains instructions for making protein



Chromosomes are tightly packed strands of DNA and proteins



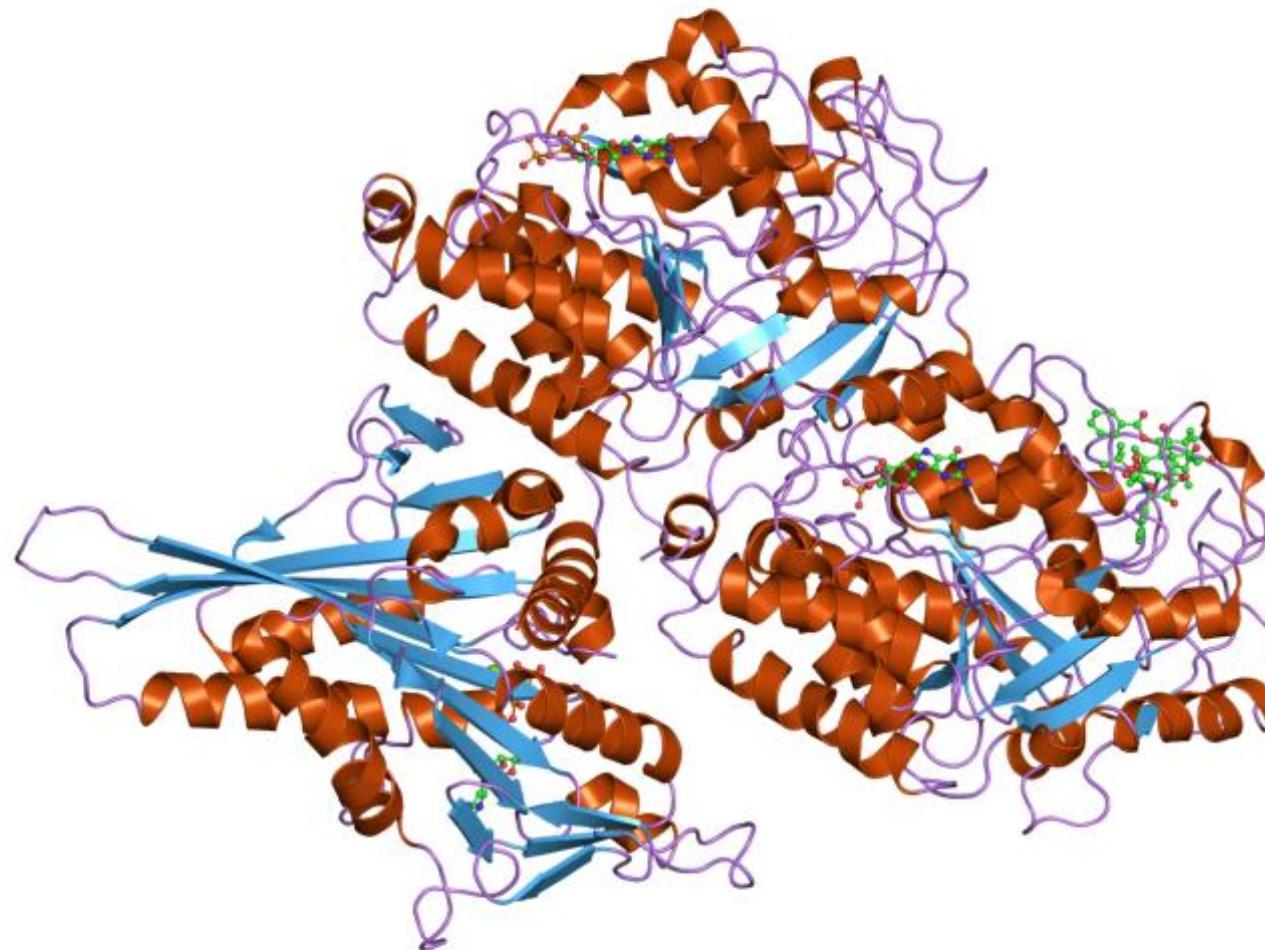
Proteins make up the structures of the cell
And/or perform functions (enzymes)



Tubulin: <https://www.abbkine.com/trakine-pro-live-cell-tubulin-staining-kit/>

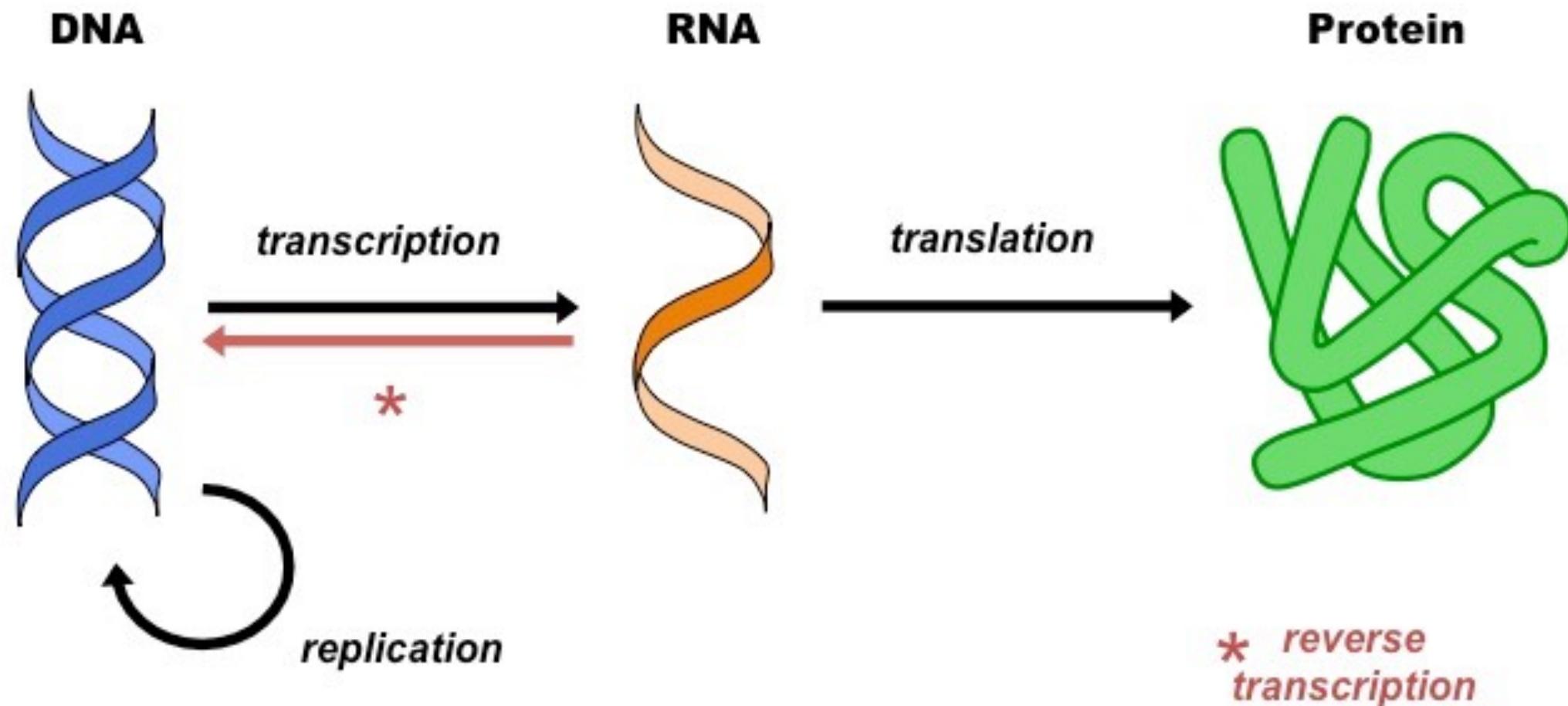
Watch: Inner Life Of A Cell - Full Version
https://www.youtube.com/watch?v=B_zD3NxSsD8

Tubulin “Ribbon” model



What a cell/reader/computer
sees
(information)

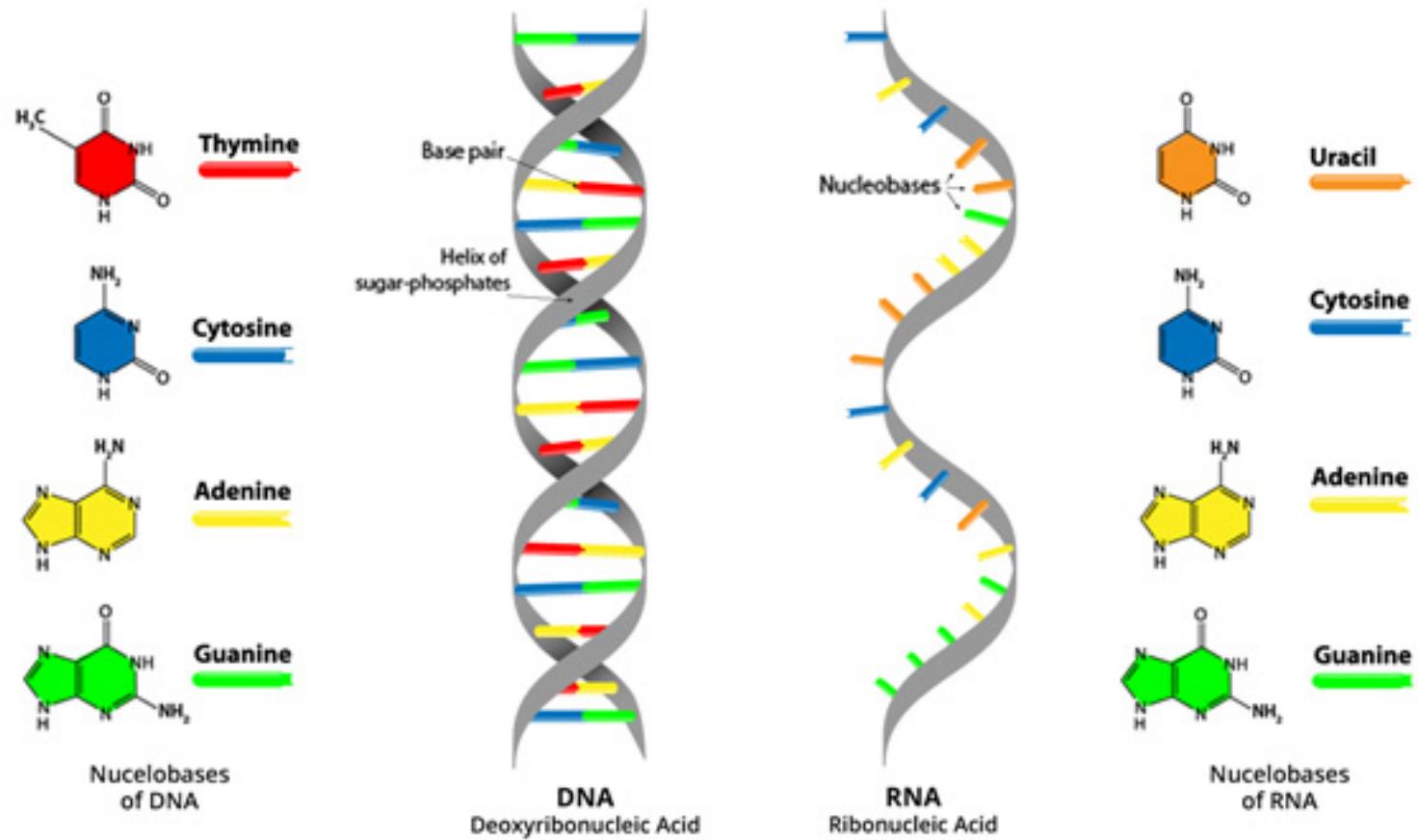
DNA contains instructions for making protein



Tubulin amino acid sequences

>NM_001270399.1 Homo sapiens tubulin alpha 1a (TUBA1A), transcript variant 2, mRNA
ATAATGGATGCTGGCCGACTGCTCTGCACGGTCTTGTCTAAAGGATGCAAACAGTCTACGGATGCTAGAGAAAAAGGGTGGGGAGAGATTACCTCATCCCACGTCGCTTGACCAATCACCAAGTCTCCTGTCATGGCTTCTCTGGGCAGATTGGGGTCTGGACCAACAGAAAAGGCCCGCCATCCCCATGGTGAACCGAGTTGTATAGGGAGCCGATCCGCCATGTGCCGAGGTTCTTACATGACCGCTAACAGAGTCGCGCTGTAAGAAGCAACACCTCTCCTCGTCTCCGCCATCAGCTGGCAGTCGCGAAGCAGCAACCAGTGTGAGAATCGGCTCGGCTTTGTGGCGTTGGAGTCAGCGCCCCCAGGCTACTTGGAAAACCTTAAGCTCTTCTTCGTAAGCTCTCTGGCGAGGGTGGTGGTAGTTGTGAGGTTAGCTAGCCCCAATCCTCAAGCCCCGCCGCCAGTGCAGGAAACGGGCCAGTACTGCGCCAGGGCGCAGCAGAGCGCTGGGGAGGAACAAAGCGGCCCTAGGCCTGTGGGGCCACTTTCTGTCGCGTTCTCTGGGGACCGGGAGAGGAGGAGGCACCCAAAAAGAGCGGGGGCGTTGGCGAGCTGGGGAGGGGGAACGGAAACAAAGCGCAGCCTAGGGTTAGCGTGGGAAGACCCCTCCGCGGTCTTGGCGTTTGGAAAGATACCCACACATTCCCGGAAAACATGCGTAGTGCATCTCCATCCACGTTGGCCAGGCTGGTCCAGATTGCAATGCCGTGGAGCTACTGCCCTGGAACACGGCATCCAGCCCAGTGGCCAGATGCCAAGTGACAAGACCACTGGGGAGGAGATGATTCTCAACACCTCTTCAGTGAGACGGGGCTGGCAAGCATGTGCCCGGGCAGTGTAGACTTGAACCCACAGTCATTGATGAAGTTCGCACTGGCACCTACGCCAGCTCTCCACCCCTGAGCACTTATCACAGGCAAAGAAGATGCTCCAATAACTATGCCGAGGGCACTACACCATTGCAAGGAGATCATTGACCTCGTGTGGACCGAATTGCAAGCTGGCCGACCAGTGACGGGTCTCCAGGGCTTCTGGTTTCCACAGCTGTAGTTGAGCCCTACAACCTCATCCTCACCCACACCCACACCCTGGAGCACTCTGATTGTCCTCATGGTAGACAATGAGGCCATCTAGACATCTGCGTAGAAACCTCGATATTGAGCGTCCAACCTATACTAACCTGAATAGGTTAATAGGTCAAATTGTCCTCCATCACTGCTTCCCTGAGATTGATGGAGCCCTGAATGTTGACCTGACAGAATTCCAGACCAACCTGGGCCATCCCCGCACTCCACTTCCCTGGCCACATATGCCCTGTCTGAGAAAAGCCTACCATGAAACAGCTTCTGAGAGATCACCACATGCTGCTTGGCCAGCAACAGATGGTAAATACATGGCTTGCTGCCTGGTACCGTGGTACGTGGTCCAAAGATGTCAATGCTGCCATTGCCACCATCAAGACCAAGCGTACATCCAGTTGTGGATTGGTCCCCACTGGCTCAAGGTTGGCATCAACTACCAGCCTCCACTGTGGTGCCTGGTGGAGACCTGGCCAAGGTACAGAGAGCTGTGTCATGCTGAGCAACACCACAGCATTGCTGAGGCCCTGGCTCGCCTGGGACCAAGTTGACCTGATGTATGCCAAACGTGCCCTTGTTCAGGTACGGTGGGGAGGGGATGGAGGAAGGTGAGTTTCAGAGGCCGTGAGGACATGGCTGCCCTGAGAAGGATTGAGGAGGGTTGGTGGATTCTGTTGAAGGAGAGGGTGAGGAAGAAGGGAGAGGAATACTAAAGTTAAACAGTCACAAAGGTGCTGCTTTACAGGGAAAGCTTAAACATTGAAAAGTTGTGGTCTGATCAGTTAATTGATGTAGCAGTGTATGCTCTCATATAATTACTGACCTATGCTAAACATGAATGCTTGTACAGACCCAAGCTGCCATTCTGTGATGGGTTTGA ATAAAGTATTCCCTGTCTAAATGAAAAAAAAAAAAAA

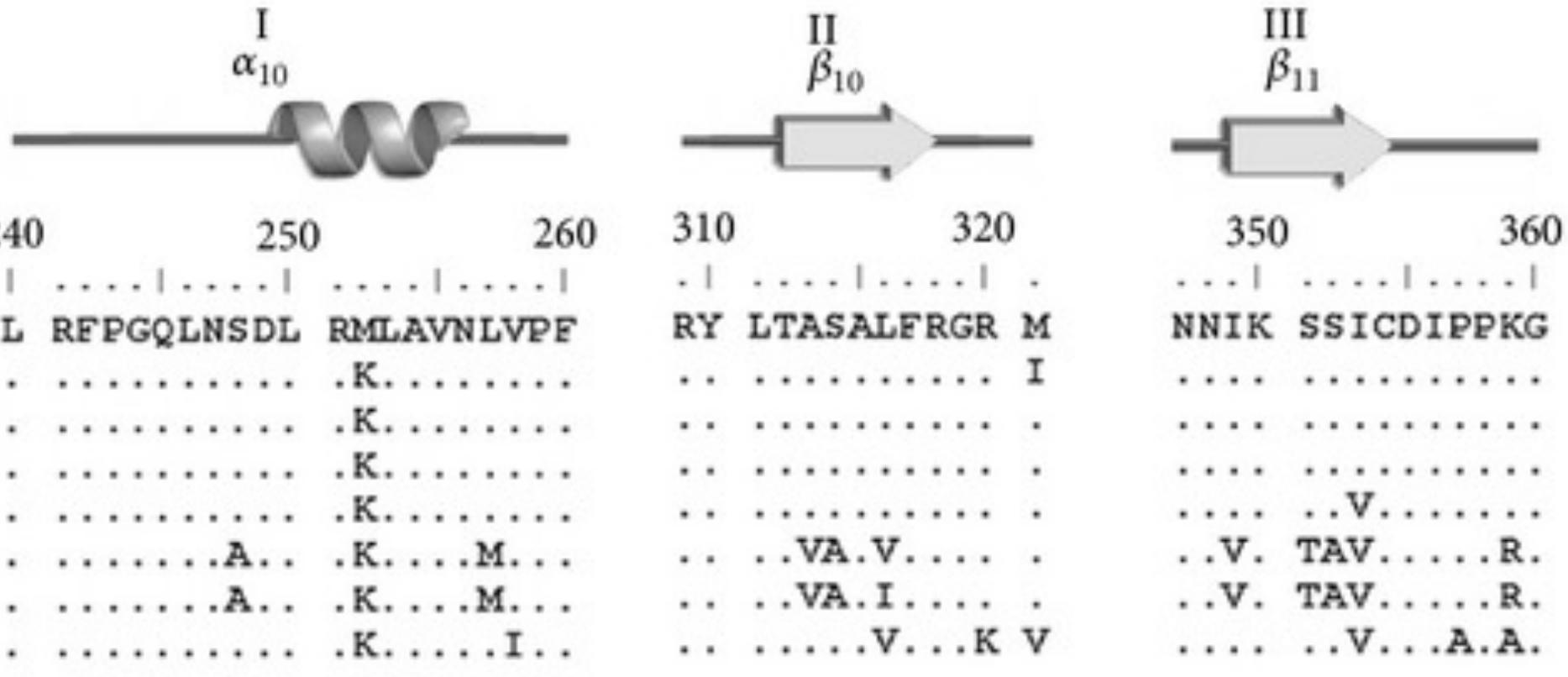
RNA



The Genetic Code

		Second letter					
		U	C	A	G		
First letter	U	UUU UUC UUA UUG	Phe Ser Leu	UCU UCC UCA UCG	Tyr STOP STOP	UGU UGC UGA UGG	Cys STOP Trp
	C	CUU CUC CUA CUG	Leu	CCU CCC CCA CCG	Pro	CAU CAC CAA CAG	His Gln
	A	AUU AUC AUA AUG	Ile Leu	ACU ACC ACA ACG	Thr	AAU AAC AAA AAG	Asn Gln
	G	GUU GUC GUA GUG	Val	GCU GCC GCA GCG	Ala	GAU GAC GAA GAG	Asp Glu
						Third letter	

Tubulin amino acid sequences



Our next experiment bacterial genetic engineering

