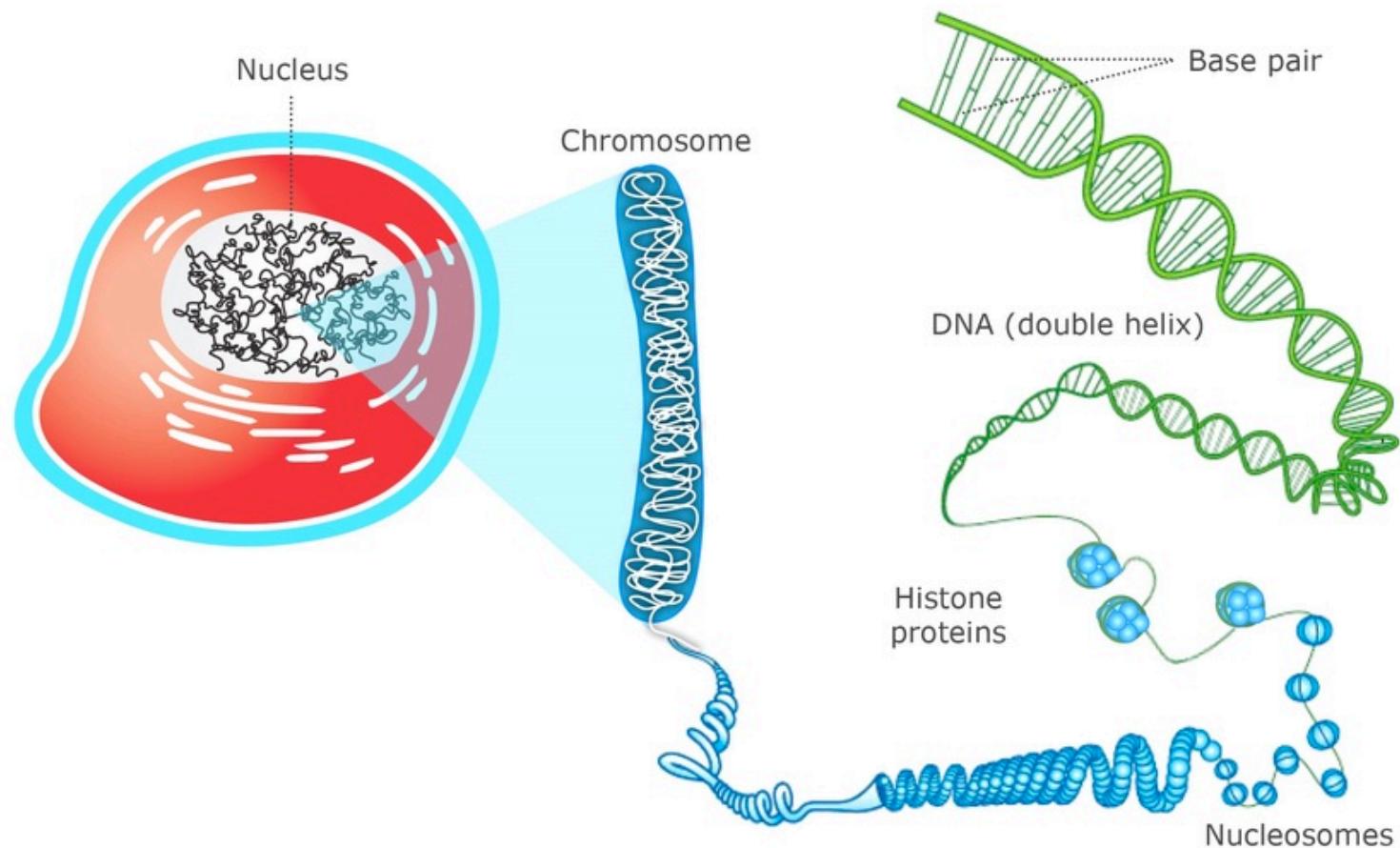
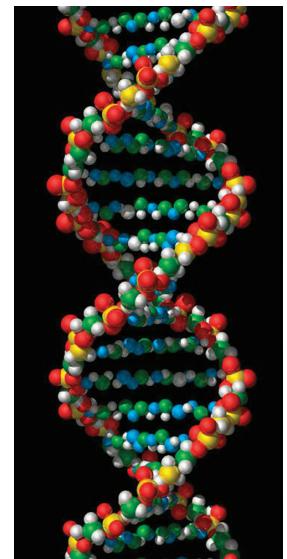
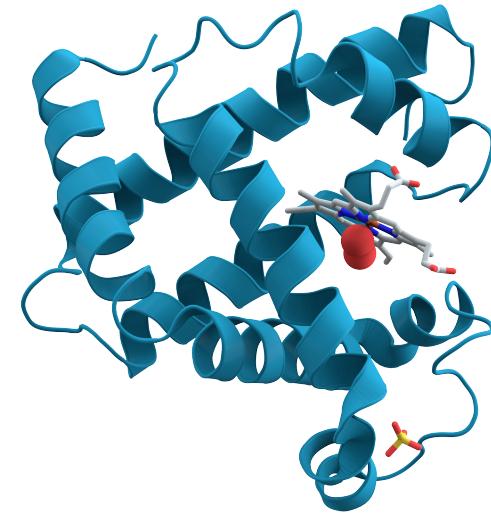


PCR DNA Basics

Accessing the cell



Molecular Components of the Cell



Images:

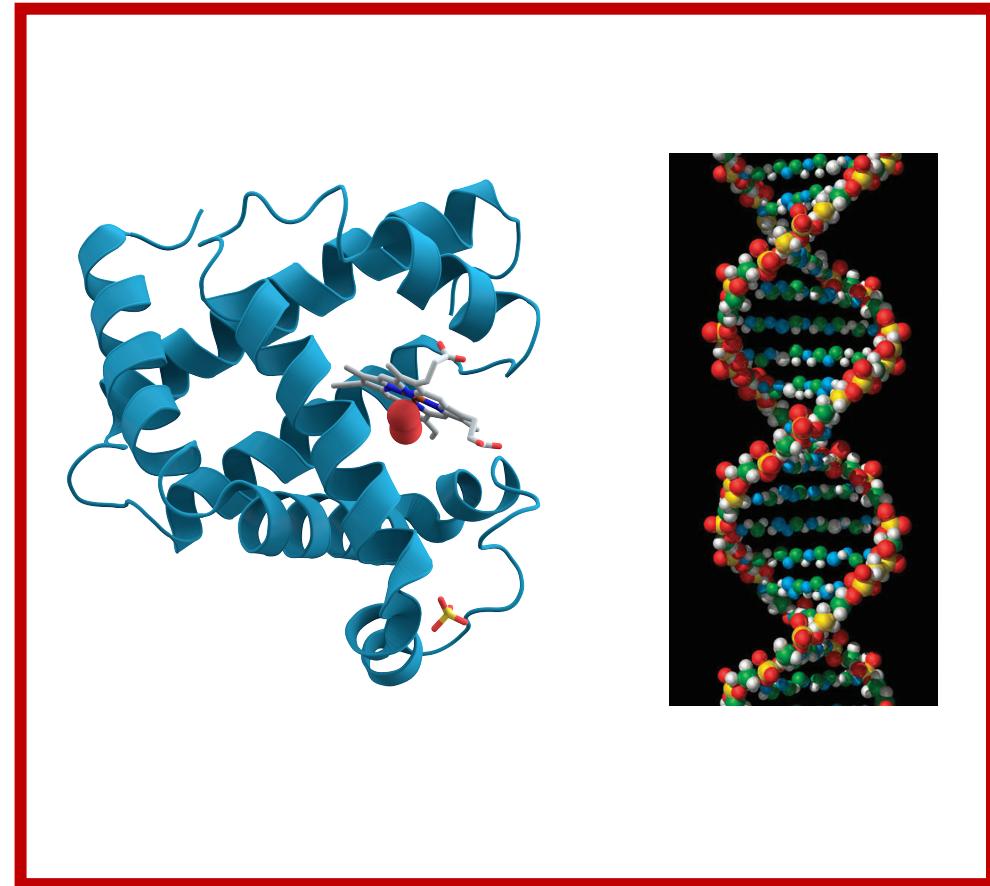
Sugar: <https://theconversation.com/what-the-19th-century-fad-for-anti-slavery-sugar-can-teach-us-about-ethical-christmas-gifts-128968>

Protein: <https://en.wikipedia.org/wiki/File:Myoglobin.png>

Fat: https://en.wikipedia.org/wiki/Fat#/media/File:Margaryn_022.jpg

DNA: <https://www.livescience.com/37247-dna.html>

Molecular Components of the Cell



Information Carriers

Images:

Sugar: <https://theconversation.com/what-the-19th-century-fad-for-anti-slavery-sugar-can-teach-us-about-ethical-christmas-gifts-128968>

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Information (theory)

$$H(X) = - \sum_{i=1}^n P(x_i) \log P(x_i)$$

Shannon's Entropy Equation

Entropy: How ordered/disordered something is

Information (theory)



Information (theory)

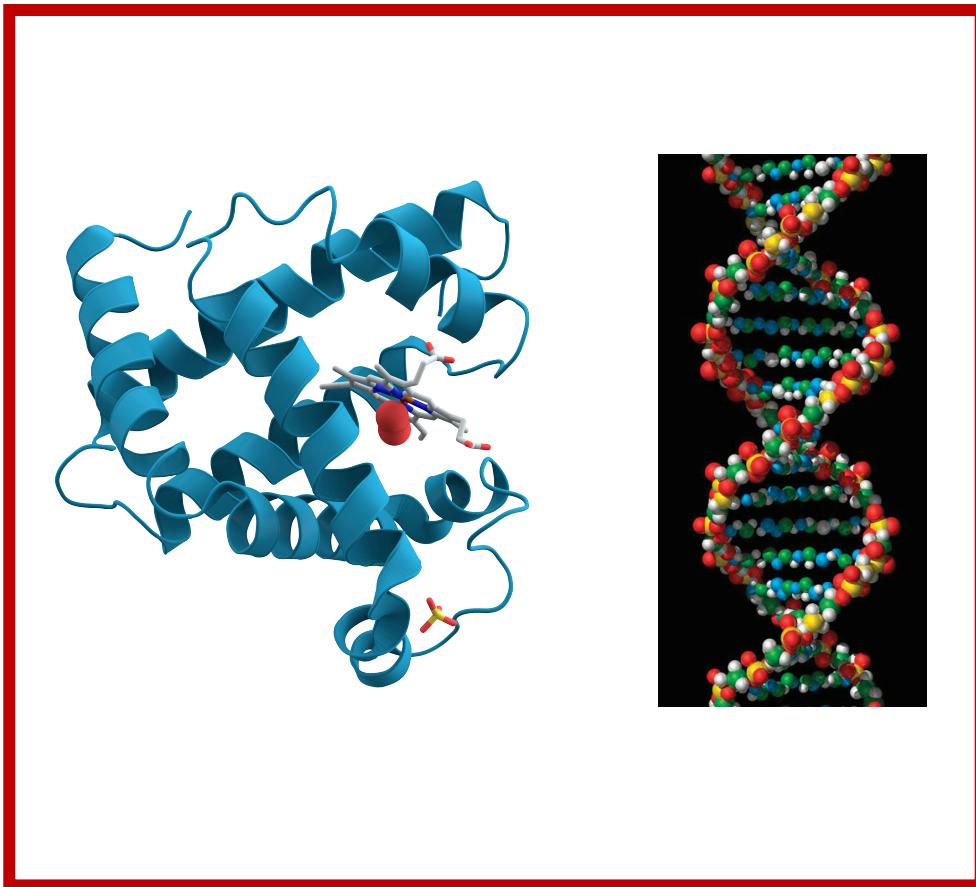


Images:

<http://tomalphin.com/2014/03/from-buckets-to-bins-how-to-sort-a-lot-of-lego.html>

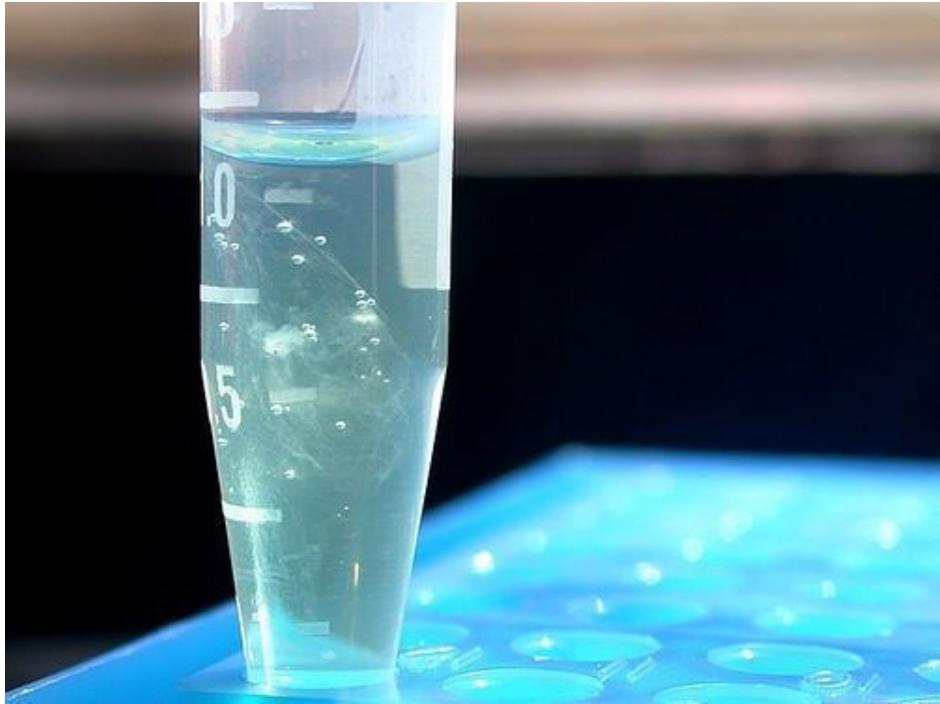
<https://isthmus.com/news/cover-story/adult-lego-hobbyists-build-bricks/>

Information (theory)



Information Carriers

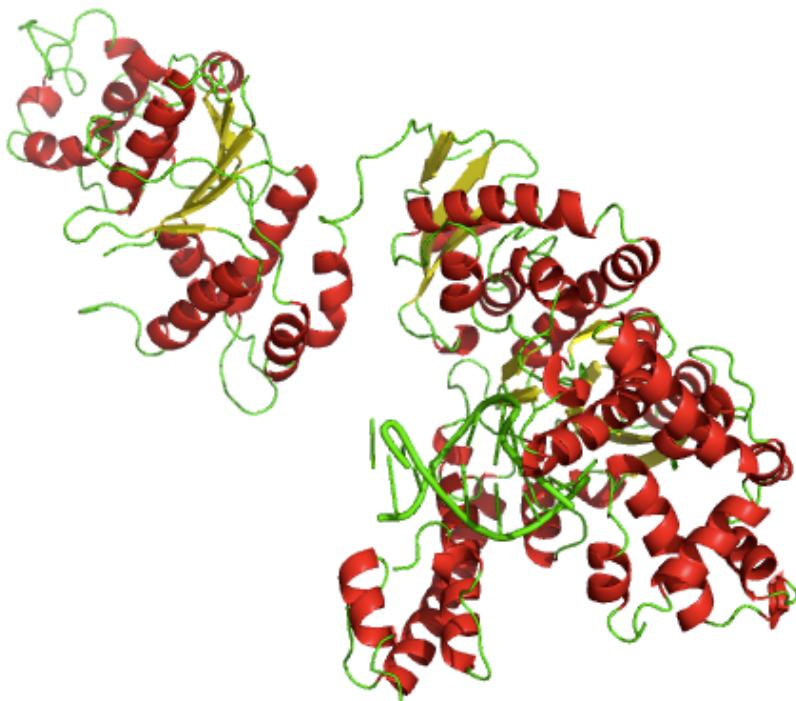
From molecules to sequences



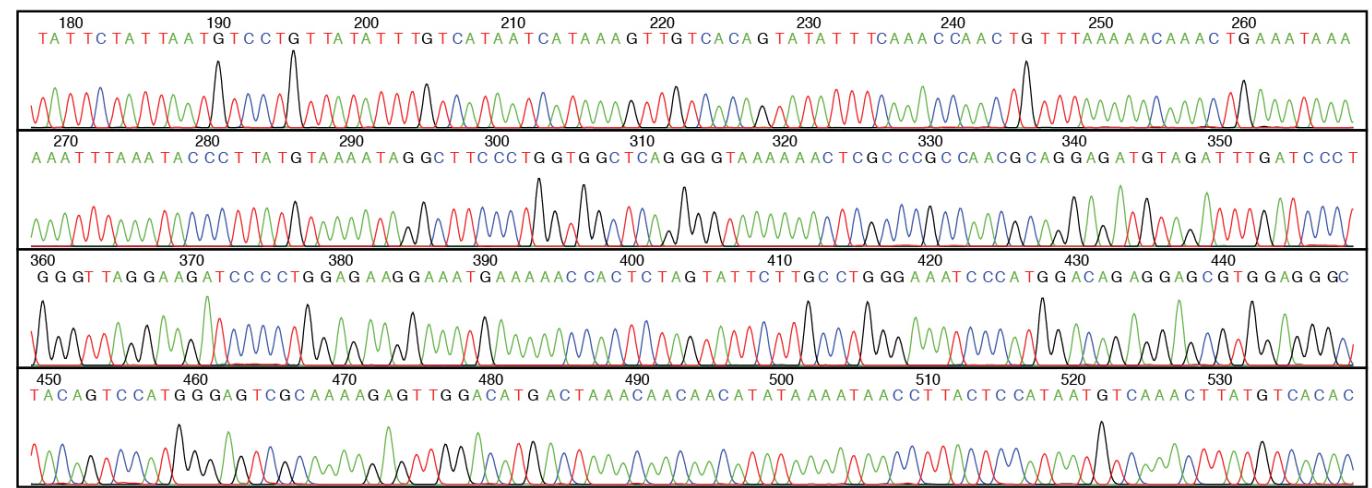
>MT506346.1 Homo sapiens isolate AGENOME-ZPMRG-Z-V1.0 mitochondrion, complete genome
GATCACAGGTCTATCACCCCTATTAAACACTCACGGGAGCTCCATGCATTGGTATTCGTCTGGGG
GTGTGCACCGCGATAGCATTGCGAGACGCTGGAGCCGGAGCACCCATGTGCACTATCTGCTTTGATT
CTGCCCATCTCATTATTATCGCACCTACGTTCAATATTACAGGCGAACATACTTAAGTGTGTTA
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AAACCCCAAAAACAAAGAACCTAACACCAGCCTAACAGATTCAAATTATCTTTGGCGGTATGCA
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CAAAGACACCCCCCACAGTTATGCTTACCTCTCAAAGCAATACACTGAAAATGTTAGACGGGCT
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CAATGCAGCTAAACAGCTTAGCCTAGCCACACCCCCACGGGAAACAGCAGTGATTAACCTTACAGAATA
AACGAAAGTTAACTAAGCTATACTAACCCAGGGTTGGTCAATTCTGTGCCAGCCACCGCGGTACACG
ATTAACCCAAGTCAATAGAAGCCGGCGTAAAGAGTGTTTAGATCACCCCTCCCCAATAAGCTAAAAC
TCACCTGAGTTGAAAAAACTCCAGTTGACACAAATAGACTACGAAAGTGGCTTAACATATCTGAACA
CACAATAGCTAACGACCCAAACTGGGATTAGATACCCACTATGCTTAGCCCTAACCTAACAGTTAAAT
CAACAAAAGTCTCGCCAGAACACTACGAGCCACAGCTAAACTCAAAGGACCTGGGGTGCTTCATAT

From molecules to sequences

Polymerase Chain Reaction



DNA Sequencing



DNA sequence data from an automated sequencing machine

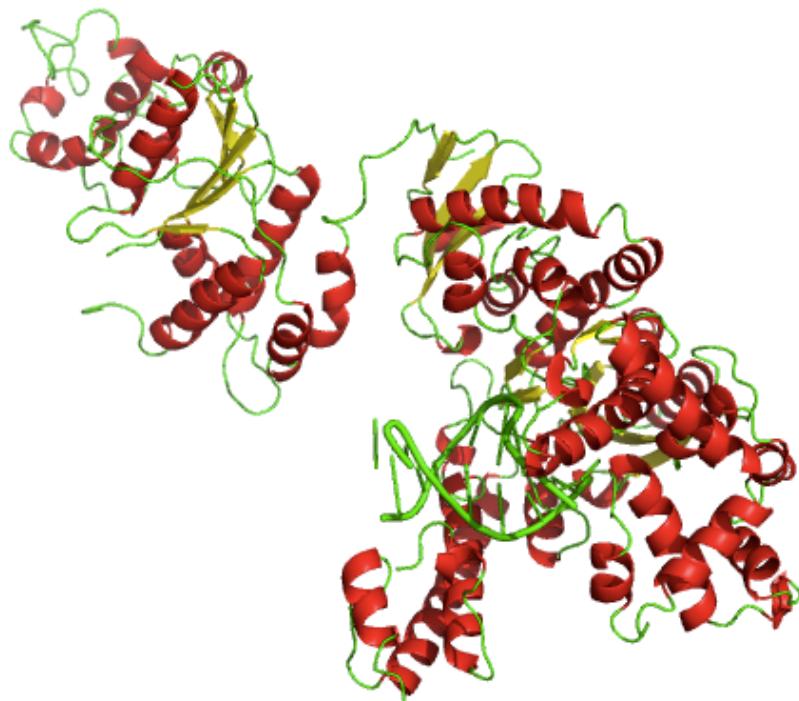
Images:

https://en.wikipedia.org/wiki/Taq_polymerase#/media/File:Taq.png

<https://www.genome.gov/genetics-glossary/DNA-Sequencing>

From molecules to sequences

Polymerase Chain Reaction



To get DNA Sequencing to work, we first need many copies of DNA...

(Brighter signal, better photo)

Images:

https://en.wikipedia.org/wiki/Taq_polymerase#/media/File:Taq.png

<https://www.genome.gov/genetics-glossary/DNA-Sequencing>

Making a copy

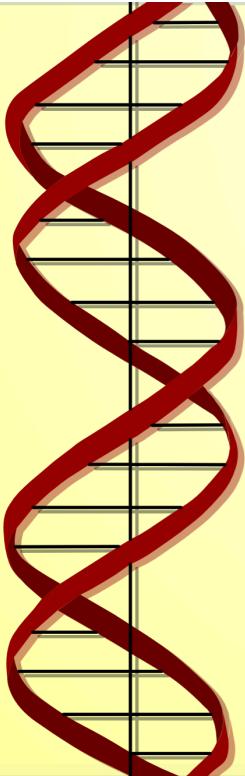


Images:
https://www.faxexpress.com/copiers/Xerox/Xerox_AltaLink_C8135-slash-H2_Copier.html

PCR (molecular) Components

1. Polymerase (taq)
2. Template DNA
3. Primers
4. Nucleotides (dNTPs)

PCR Animation



Polymerase Chain Reaction (PCR)

- **Amplification**

Enter for a step by step guide to how DNA is copied in a PCR reaction.

- **Amplification Graph**

Enter to chart the number of DNA pieces (PCR products) made for each cycle of the PCR reaction.

<https://dnalc.cshl.edu/resources/animations/pcr.html>

PCR Machine



DNA Amplification by PCR

Why Taq Polymerase?



Images:

<https://bioinfo.bact.wisc.edu/themicrobialworld/LAHT/b27.html>

Why do we need primers?

(information)

