

Unit 1 - Introduction and the Biochemistry of Life

By [Alejandro Avella](#)

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Introduction and the [Biochemistry](#) of Life Overview

Videos with Professor Lander

In a series of videos, Professor Lander will

- provide an overview of the course,
- provide a review of basic biochemical principles,
- and provide an introduction to three types of macromolecules common to all cells: [lipids](#), [phospholipids](#), and [carbohydrates](#).

Deep Dive Videos

In a series of short tutorials, Robert will

- explain how to interpret chemical structures,
- teach you how to determine whether a molecule is [hydrophobic](#) or [hydrophilic](#),
- and provide the tools to identify the *types of bonds and forces that occur between molecules (no Wikipedia page)*.

Practice Assessments

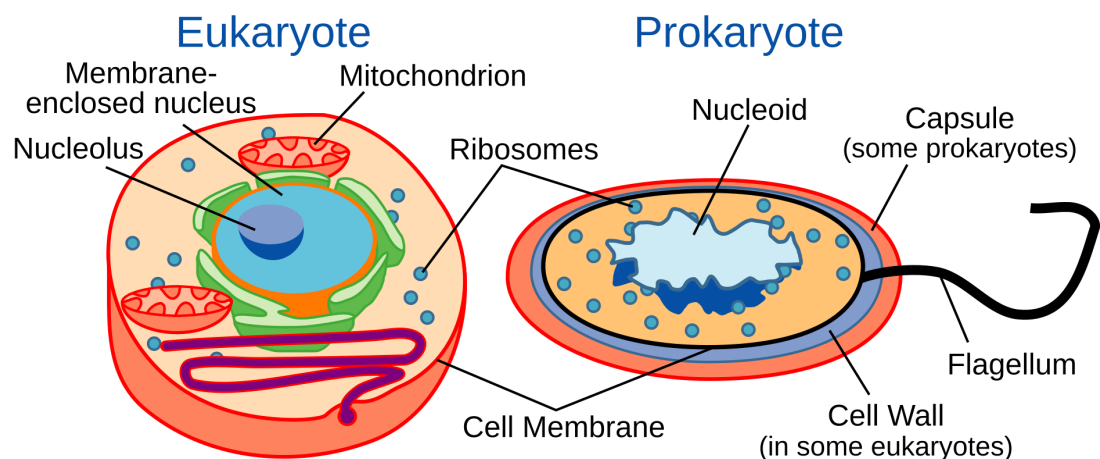
It is important to try to apply what you know with new examples, contexts, or scenarios when learning. We strongly recommend that you complete all practice assessments. Try until you get the question right. Look for more explanation with the show answer button.

- concept questions following each video (Test Yourself questions)
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Introduction and the Biochemistry of Life

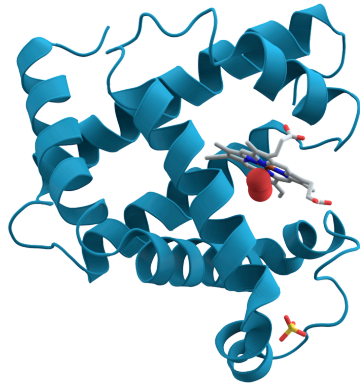
Goals

- Understand the basic components and forces found in [biological macromolecules](#).
- Understand that, despite their different levels of organization, all organisms are comprised of [cells](#), the basic unit of life.

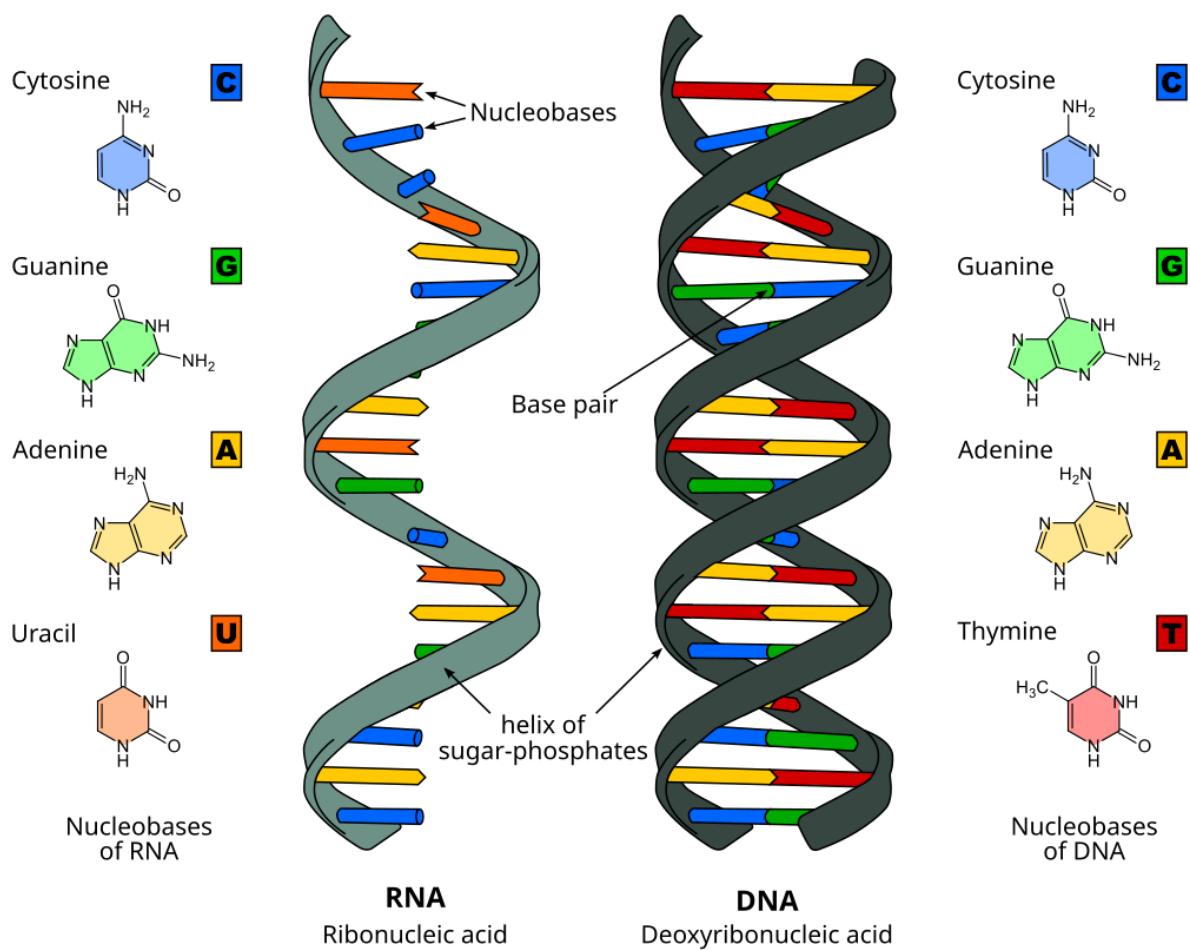


- Recognize that a cell and its various sub-cellular structures are comprised of four major classes of macromolecules:

carbohydrates, lipids, proteins, and nucleic acids.

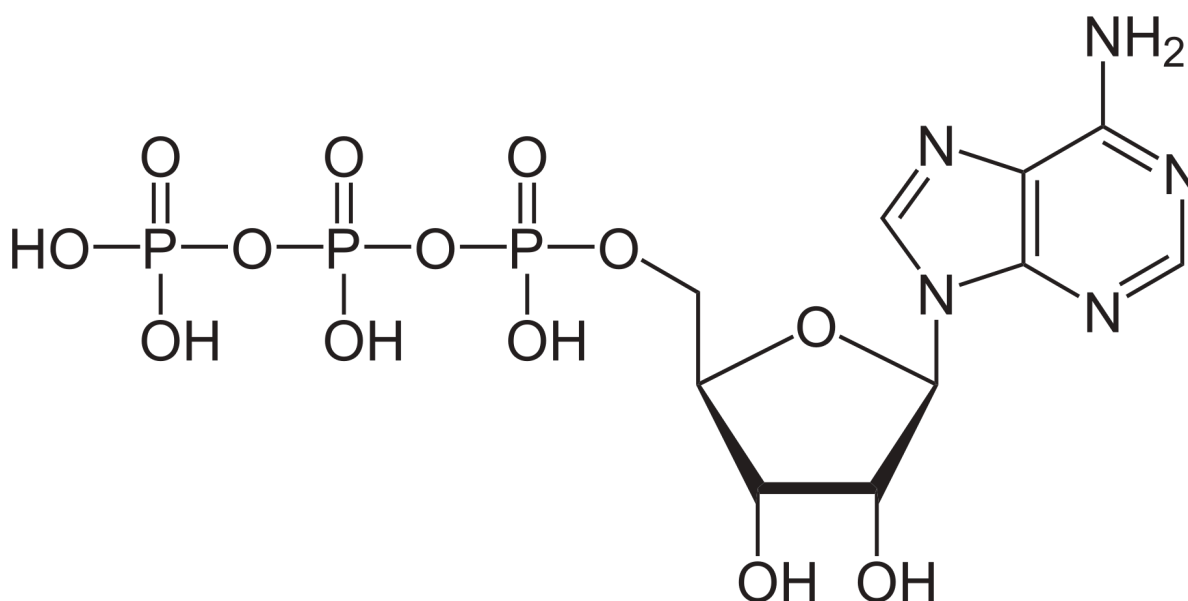


Protein Myoglobin



Nucleic acids RNA (left) and DNA (right).

- Understand the general structure of [lipids](#) and [phospholipids](#) and how this structure dictates function.
- Understand the general structure of simple and complex carbohydrate molecules and how this structure dictates function.
- Understand the general structure of [ATP](#).



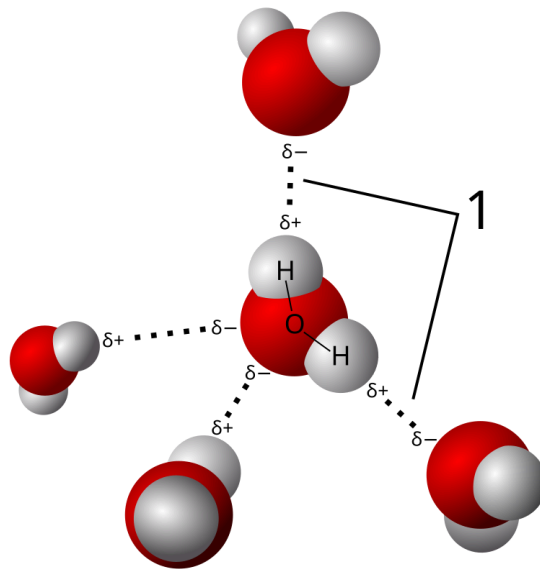
Adenosine triphosphate (ATP)

Objectives

At the end of this learning sequence, you should be able to...

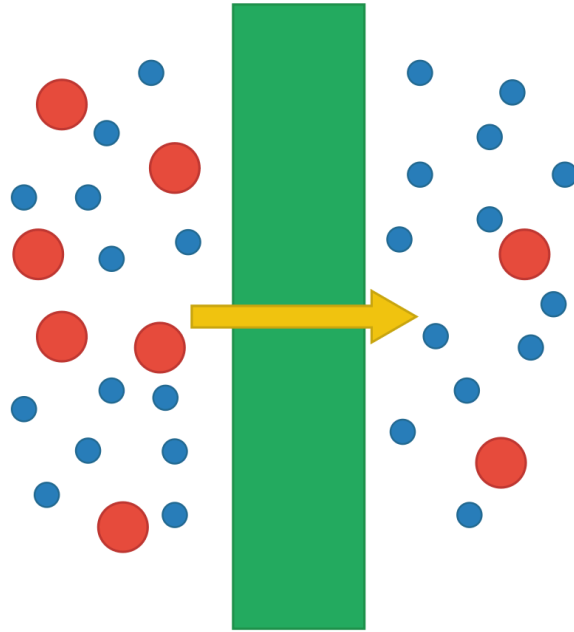
- List the most common elements found in [biological macromolecules](#) and describe the properties of these [atoms](#).
- Describe [electronegativity](#) and [electron affinity](#).

- Predict the effects of electronegativity and electron affinity on molecular interactions.
- Identify the [types of bonds](#) or forces between different interacting groups.
- Explain how [hydrogen bonds](#) are formed.



Model of hydrogen bonds (1) between molecules of water

- List examples of the importance of hydrogen bonds in biological systems.
- Design molecules with particular properties that can form a specific type of bond.
- Describe the role that [phospholipids](#) and [carbohydrates](#) have in a [cell](#).
- Describe how the basic components and forces dictate the structure and function of [phospholipids](#) and [carbohydrates](#).
- Identify the basic building blocks of [membranes](#), [carbohydrates](#), and [proteins](#).



Schematic of size-based membrane exclusion

- Draw the basic building blocks of [membranes](#) and [carbohydrates](#).
- Explain why [ATP](#) is a high-energy molecule that powers cellular work.