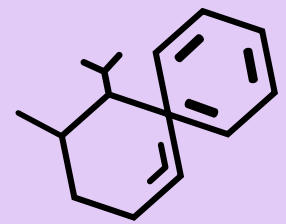


How Proteins Fold... And Do What They're Told!



All About Proteins:

Proteins are one of the most diverse groups of molecules that are involved in many important functions in the human body. They are composed of chains of amino acids that are folded and reorganized with the help of molecular chaperones. The 4 levels of protein structure are primary, secondary, tertiary, and quaternary which are held together by various types of chemical bonds and interactions. The 3D shape of proteins is known to affect its ability to perform tasks that are essential for cell growth and survival. Some protein functions include providing structural support, speeding up chemical reactions, facilitating transport of molecules, and cell signalling.

Structure & Function = Interconnection!

The interconnection between protein structure and function shows how scientific explanations are based off of experimentation and evidence. If a protein is in ideal conditions and has proper support from chaperones, its final structure is more likely to be fully functional with a high-performance efficiency. However, protein denaturation is when a protein becomes unfolded or changes shape which could be both reversible and irreversible. This can be caused by several environmental factors or changes in conditions such as pH, temperature, and pressure. Once a protein is denatured, it may not be able to function properly or become an aggregate structure which leads to other damage and diseases within the body. These concepts have been thoroughly tested by scientists so that the results could be visually analyzed and explained. For example, placing a protein in extremely hot temperatures to see the deconstructed shape and loss of function or cooking a piece of chicken and being unable to reverse the process.

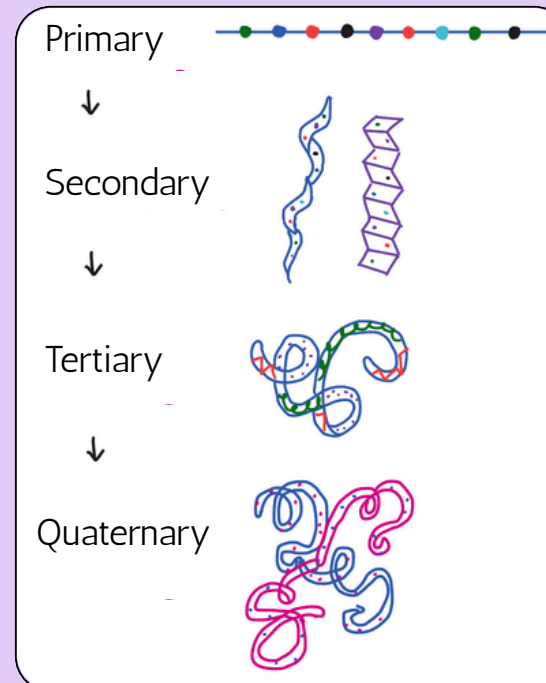


Figure 1. Levels of Protein Structure

Why does this matter? And how can it be used in classrooms?

This principle is important because it not only applies to proteins but also many other biomolecules that play a part in ensuring bodily functions can occur. It is necessary in science to conduct experiments and observe the findings to provide reason behind results so that less false information can get spread. Also, quality education extends beyond the classroom, and students can begin to realize that these phenomena happen in everyday life. Curling hair, frying eggs, and acquiring sunburns are activities that most people will do throughout their life which all involve protein denaturation.

This resource could be used by teachers to introduce proteins as a biomolecule for a lesson. Proteins are one of the main 4 building blocks of life and it would be important for students to understand the basics of proteins before moving onto more complex content or other biomolecules such as carbohydrates, lipids, or nucleic acids.

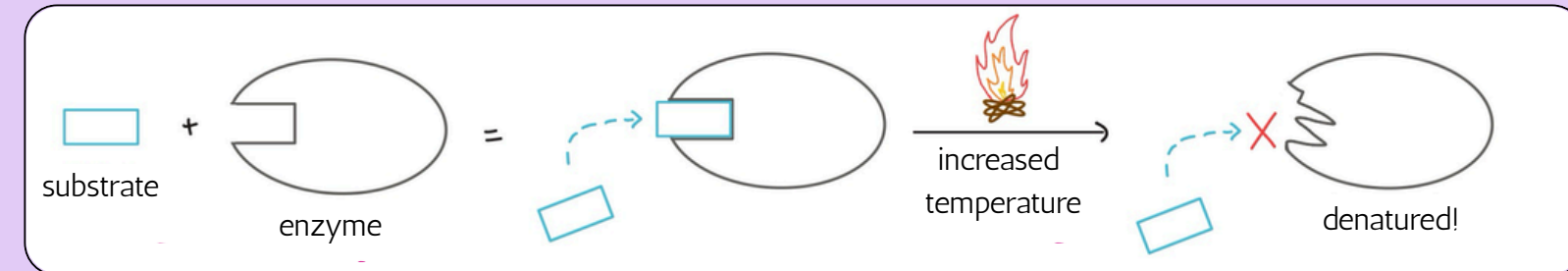


Figure 2. Protein Denaturation

Resources Used:

1. Masson, P., & Lushchekina, S. (2022). Conformational Stability and Denaturation Processes of Proteins Investigated by Electrophoresis Under Extreme Conditions. *Molecules* 27(20), 6861. <https://doi.org/10.3390/molecules27206861>
2. Ramroop Singh, N. (2023). Introduction to Biology (Proteins). *Pressbooks*. <https://openintrobiology.pressbooks.tru.ca/chapter/unit2-3/>