



Folding and Molding Hands-on Protein Structure



Dan Williams

BS, MA Biology

High School Teacher

NYS Master Teacher

Biology SAR - STANYS Suffolk



Dan.Williams@shelterisland.k12.ny.us

@Willida25



Workshop Learning Goals

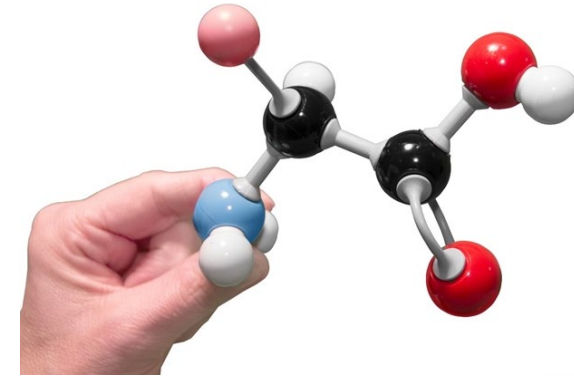
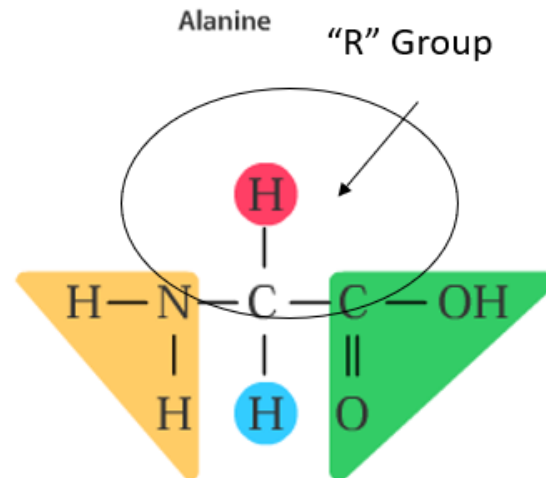
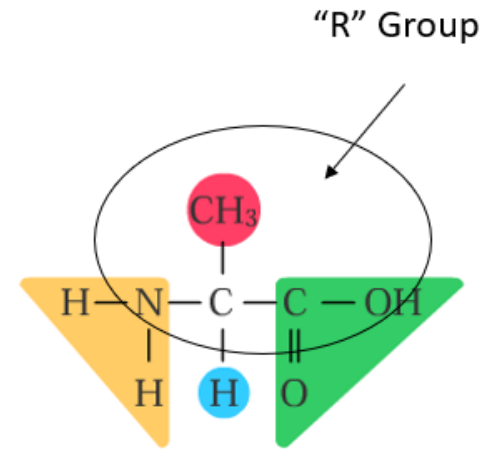
1. What makes a good model?
2. What can we learn from the Amino Acid Starter Kit?
3. What do you find difficult when you are teaching about protein structure/function?
4. Where do multidimensional models help with this topic?
5. How can you show protein chemistry, how shape influences function and how mutations change function with this model?

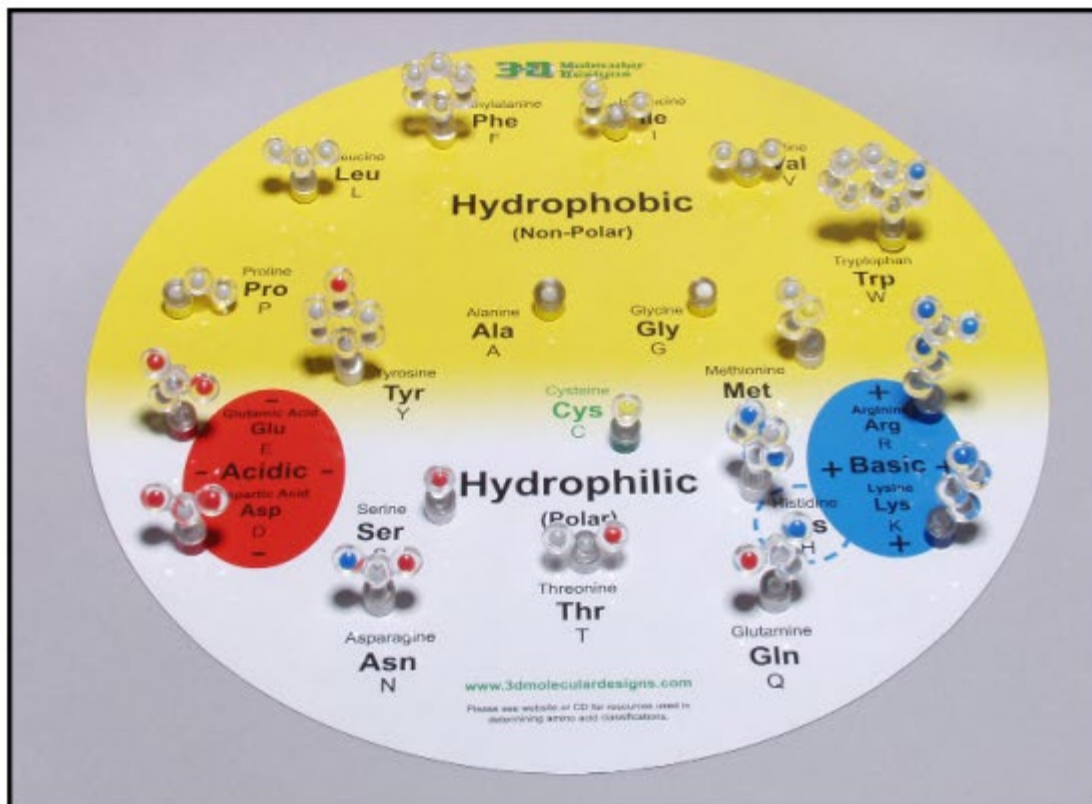
Amino Acids

Each amino Acid has a different “R” Group.

Different elements at the “R” group provide Amino Acids with different shapes.

There are 20 different Amino Acids. – Like an alphabet of 20 letters, these amino acids make the protein “words”





Place amino acid sidechain on the magnetic Chemical Properties Circle according to its chemical properties. You will need to consult the Amino Acid Sidechain List in your kit to find the name of each sidechain, so you can position it correctly on the circle.

Build your own protein

6 **Hydrophobic** sidechains
 2 **Acidic** sidechains
 2 **Basic** sidechains
 2 **Cysteine** sidechains
 1 Methionine sidechain
 2 other **Polar** sidechains



Explore ANY Structure!



Center for
BioMolecular
Modeling

Jmol User Design Environment (JUDE)
An Online Tool for Creating Protein Visualizations and 3D Printed Models

Open a New Molecular Structure X

A molecular structure file includes the X, Y, and Z coordinates to position each atom in molecule in 3D space. The buttons below will load structure files in the Jmol window to the right.

SMILES sequence

Public .PDB file (by ID)

To learn more about SMILES sequences or PDB files, how to find them, and how to load them into the Jmol User Design Environment, visit our [Jmol Training Guide](#).

If your design requires a non-public or custom PDB structure file, we recommend using the local (non-online) Java-based version of Jmol, [available to download here](#). Learn more about using the Java-based version of Jmol with the [Jmol Training Guide](#)

Save Your Design

Reload a Previous Design

3D Print Your Design

Jmol Training and Syntax Resources

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BioMolecular Modeling

Jmol Console ▾

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Workshop NGSS Connections (and/or other applicable standards)

SEPs	CCCs	DCIs
Asking Questions and Defining Problems	Patterns	LS1.A: Structure and Function
Developing and Using Models	Cause and Effect: Mechanism and Explanation	
Constructing Explanations and Designing Solutions	Scale, Proportion, and Quantity	
Engaging in Argument from Evidence	Structure and Function	
Analyzing and Interpreting Data	Stability and Change	

Thank you!

Visit us at booth 1600

Transforming Science Learning

Dan.Williams@shelterisland.k12.ny.us

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