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The Effect of Intramolecular Bonding on the Structure of Odor Binding Protein-4

Intramolecular bonds are hugely important to the function of proteins. This conclusion was reached by the analysis of Odor Binding Protein-4, a small protein found in mosquitoes. These data were provided by a local research institution at which one of us (Alex Port) participated in the generation of these crystallographic data. The analysis of these data was a two stage process. First we carefully reviewed the data using Coot, a detailed protein analysis program, to find evidence of intramolecular bonding. Output from this process was analyzed with Pymol, another program which allowed us to view the protein on a larger scale and determine the effects of these intramolecular bonds. Through this analysis we found three types of intramolecular bonds, including three examples of disulfide bridges, the strongest and rarest intramolecular bond. Approximately forty hydrogen bonds were also found. One significant finding related to bond type is one of scale: the stronger bonds worked between the larger secondary structure elements, and the weaker between individual polypeptides. The presence and type of intramolecular bonds within this protein are determined by the order of the peptides, the primary structure. The intermolecular bonds in turn greatly influence the tertiary structure of the protein, its shape. These bonds are responsible for the proteins' current structure. In proteins, structure is what determines function, as the only thing that differentiates proteins is structure, yet they have so many different functions. This means that the intramolecular bonds are very important to the functioning of proteins.