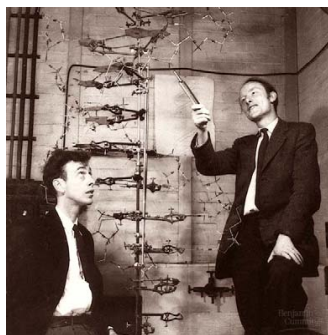


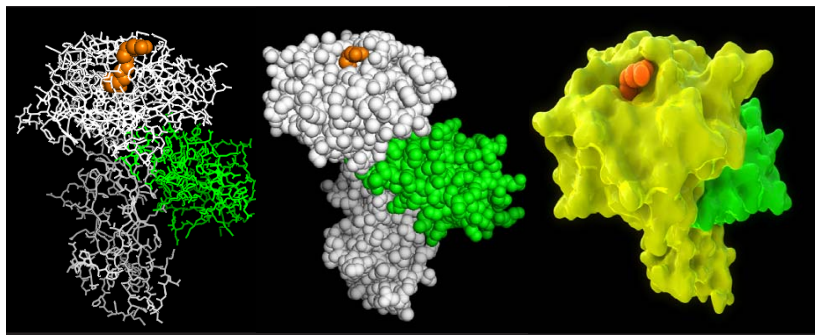
3D Prototyping Molecules for Research

The crystal structure of avian CD1

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Crick & Watson
Early model of DNA Molecule



Computer Renderings of the CD1 Molecule



3D Prototype of the CD1 Molecule

3DRG was contacted by Christopher C. Dascher, Ph.D. from the Mount Sinai School of Medicine in New York to build a 3D model. He was interested in a 3D prototype for the purpose of aiding in the study of a molecular structure he and his colleagues were researching. The original PDB (Protein Data Base) file was first converted to VRML format with Pymol and then imported into Cinema 4D. The file was then prepped and exported in STL format and sent to 3DRG.

The research centered around studying the avian CD1 protein to better appreciate the evolution of the vertebrate immune system and to help make better vaccines for avian influenza. For their studies, having the 3D model of CD1 gave the team a greater appreciation of the surface contours of the ligand binding pocket of the CD1 protein. The team hypothesized that much larger lipid head groups could interact with the CD1 protein surface. The team is now in the process of testing this hypothesis.

3D physical models can be great tools for the purpose of studying molecular structures. Simple stick and ball structures have been common since the famous Watson & Crick model. With the aid of technology used primarily for 3D Prototyping, these simple "stick" models can come to life and bring better insight into the true nature of the molecular form that in the past could only be viewed on a computer screen. These models can be used in *medical research* as well as in *University classes* to better understand the molecule's complexity.

Dascher says,

"There is no substitute for being able to study a molecule while it is sitting in the palm of your hand. Visual study of a molecular complex itself allows a greater appreciation of the interactions between a protein and its ligand. This can lead to novel insights that might not otherwise manifest themselves using only 2D images. There is also a certain esthetic satisfaction that is often missing in molecular biology in that we only see the results of the actions of the molecules we study. Solid 3D representation of a protein or molecule lets us see and feel the molecular world in a way that is otherwise inaccessible to our physical senses."

Christopher C. Dascher from the Mount Sinai School of Medicine in New York, Dirk M Zajonc & Haral Striegl from the Division of Cell Biology, La Jolla Institute for Allergy and Immunology, & Ian A. Wilson from the Department of Molecular Biology and the Skaggs Institute for Chemical Biology. *The crystal structure of avian CD1 reveals a smaller, more primordial antigen-binding pocket compared to mammalian CD1. Proc Natl Acad Sci U S A 105:17925-17930.* For more information about the study visit: <http://www.pnas.org/content/105/46/17925>



The "STL" file was sliced up into thousands of layers and then printed on an Objet Eden 333. A 12 micron thin layer of photopolymer was jetted onto the build plate that was then cured by an ultraviolet light. The tray would lower and another layer was applied directly onto of the previous layer. This process was repeated until the model was complete. After the model was finished it was painted to better enhance the different structures. The model was also printed on a Z-Corp machine that applies the color directly to the model with no post finish painting necessary.

